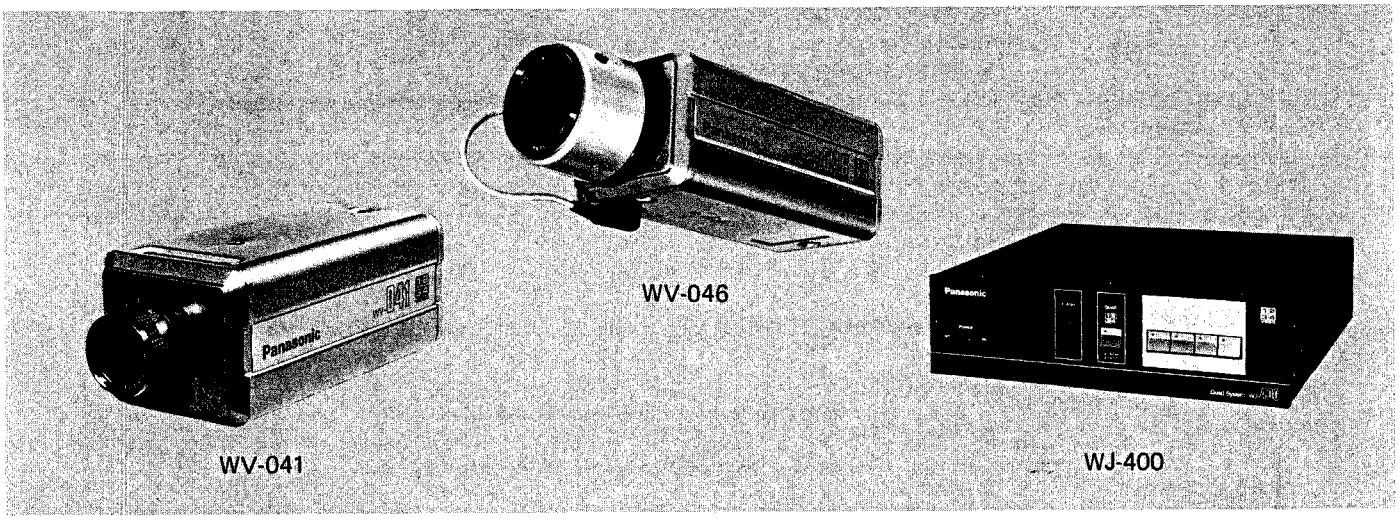
ORDER NO. VKD86050990C8

Service Manual

CCTV Quad System

CCTV Camera **Quad Unit**

WV-041/WV-046 WJ-400



CONTENTS

SPECIFICATIONS 1
MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS
CCTV Camera and Quad Unit 2
INSTALLATION 4
LENSES 5
CONNECTIONS 7
OPERATING PROCEDURE 10
ADJUSTMENT 10
CIRCUIT DESCRIPTION
1. Outline 11
2. CCTV Camera WV-041/WV-046 12
3. Quad Unit WJ-400 18
ADJUSTMENT PROCEDURE
1. TEST EQUIPMENT REQUIRED 35
2. DISASSEMBLING PROCEDURE FOR ADJUSTMENT 35
3. PICK-UP TUBE REPLACEMENT 36
4. SETTING UP FOR ADJUSTMENT 36
5. ADJUSTMENT PROCEDURE 37
LOCATION OF TEST POINTS AND ADJUSTING CONTROLS 41
CHIP COMPONENTS 44
WIRING DIAGRAM
WJ-400 46
BLOCK DIAGRAM
WV-041 48
WV-046 50
POWER BOARD, CAMERA POWER BOARD, CONNECTION BOARD (WJ-400) 52
PROCESS BOARD (WJ-400) 54
SYNC BOARD (WJ-400) 56
ALARM BOARD (WJ-400) 57
SCHEMATIC DIAGRAM
WV-041 62
WV-046 65
PROCESS BOARD (WJ-400) 72
POWER BOARD, CAMERA POWER BOARD, CONNECTION BOARD (WJ-400) 75
ALARM BOARD, SWITCH BOARD, AUTO RESET BOARD, ALARM LED BOARD, POWER LED BOARD (WJ-400) 81
SYNC BOARD (WJ-400) 87
CONDUCTOR VIEW
WV-041 60
WV-046 68
PROCESS BOARD (WJ-400) 70
POWER BOARD, CAMERA POWER BOARD, CONNECTION BOARD (WJ-400) 78
ALARM BOARD, SWITCH BOARD, AUTO RESET BOARD, ALARM LED BOARD, POWER LED BOARD, (WJ-400) 84
SYNC BOARD (WJ-400) 92
EXPLODED VIEW and PACKAGING 95
REPLACEMENT PARTS LIST 100

National/Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

SPECIFICATIONS

o Quad Unit

Power Supply :	WJ-400F, WJ-400/C,G: 220V AC 50Hz
	WJ-400/B : 240V AC 50Hz
Power Consumption :	WJ-400F, WJ-400/B,C,G: Approximately 55W (with four cameras)
Camera Input :	0.7Vp-p/75 ohms x 4 (BNC)
Video Output :	1.0Vp-p/75 ohms x 1 (BNC)
power Supply for Camera :	Regulated current multiplex method
Picture Selection :	Quad or one camera picture switchable
Automatic Reset :	Reset to quad mode after adjusted timing of alarm input
	(ON/OFF : selectable, timing : 1 – 60 seconds adjustable)
External Control Connection Terminal :	SPOT MONITOR CONTROL IN x 4
	RECOVER IN x 1
	ALARM CONTROL OUT x 1
Maximum Camera Extension :	660 ft (200m) with RG-59/U (3C-2V) (DC R/1000 ft. of inner conductor : Less than 30 ohms)
Ambient Operating Temperature :	–10°C - +50°C (14°F - 122°F)
Dimensions :	320(W) x 87.5(H) x 300(D) mm
	12-5/8"(W) x 3-7/16"(H) x 11-13/16"(D)
Weight :	7.2 kg (15.8 lbs)

o CCTV Camera

Power Supply :	To be supplied from the quad unit
	Approx. 320mA
Pick-up Tube :	WV-041 : 20PE14
	2/3" separate mesh, electronic focus, magnetic deflection vidicon
	WV-046 : S4092
	2/3" separate mesh, electronic focus, magnetic deflection newvicon
Scanning System :	2:1 Interlace
Scanning :	625 Lines/50 Fields/25 Frames
Horizontal :	15.625 kHz
Vertical :	50 Hz
Synchronization :	External (Horizontal and vertical drive pulses are supplied from quad unit.)
Horizontal Resolution :	WV-041 : More than 550 lines at center
	WV-046 : More than 500 lines at center
Signal to Noise Ratio :	More than 42dB
Automatic Light Compensation :	WV-041 : 1 : 10,000
	WV-046 : 1 : 40,000 - 66,000 (Depend on the model of the Automatic Iris Lens)
Required Minimum Illumination :	WV-041 : 1 footcandle (10 lux) with F1.6 lens under incandescent light
	WV-046 : 0.05 footcandle (0.5 lux) with F1.6 lens under incandescent light
Recommended Illumination :	WV-041 : 10 footcandles (100 lux) with F1.6 lens under incandescent light
	WV-046 : 0.5 footcandles (5 lux) with F1.6 lens under incandescent light
External Control :	Electronic Beam, Electronical Focus
Lens Mount :	C-Mount
Ambient Temperature :	–10°C - +50°C (14°F - 122°F)
Dimensions :	80(W) x 66(H) x 156(D) mm
(Excluding Lens)	3-1/8"(W) x 2-5/8"(H) x 6-1/8"(D)
Weight :	WV-041 : 0.66 kg (1.45 lbs)
(Without lens)	WV-046 : 0.68 kg (1.5 lbs)

Composition

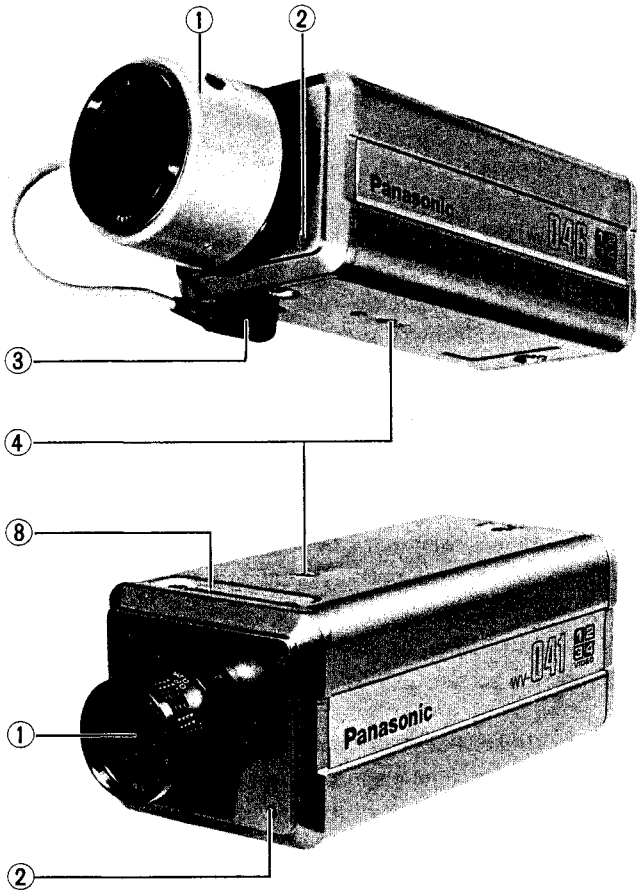
o WJ-400	Quad Unit	x 1
o WV-041	CCTV Camera	x 1
	Camera Mounting Bracket (With 4 Fixing screws and butterfly screw)	x 1
o WV-046	CCTV Camera	x 1
	Camera Mounting Bracket (With 4 Fixing screws and butterfly screw)	x 1

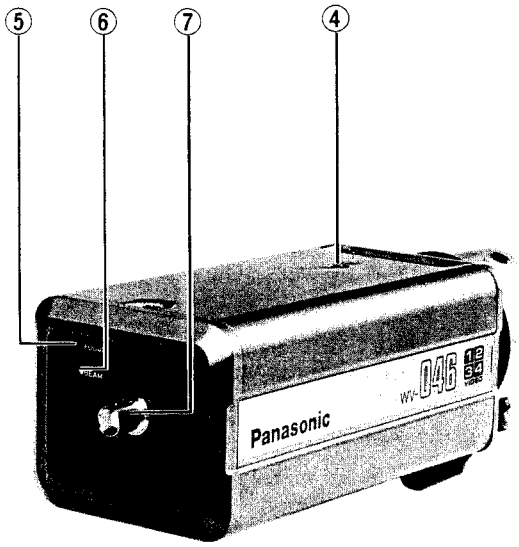
Optional Accessories

Camera Housing	WV-1710
Mounting Bracket	WV-831
Panning Head	WV-35
	WV-435
	WV-7230B
Panning Head Control	WV-32
	WV-438
	WV-7320
Lens	WV-LA8B
	WV-LA16B
	WV-LA25B
	WV-LA50B

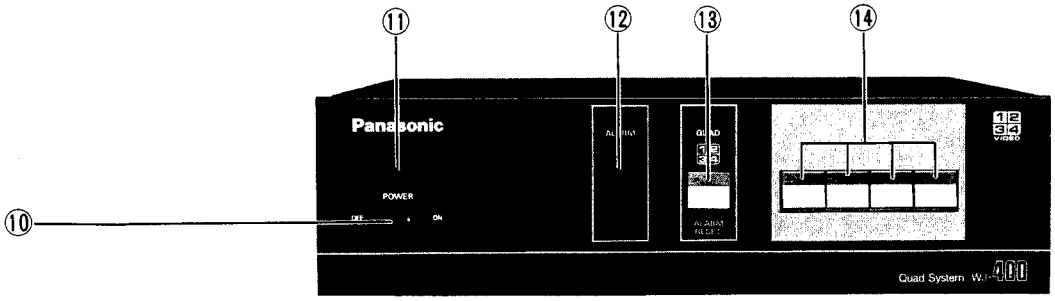
MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS

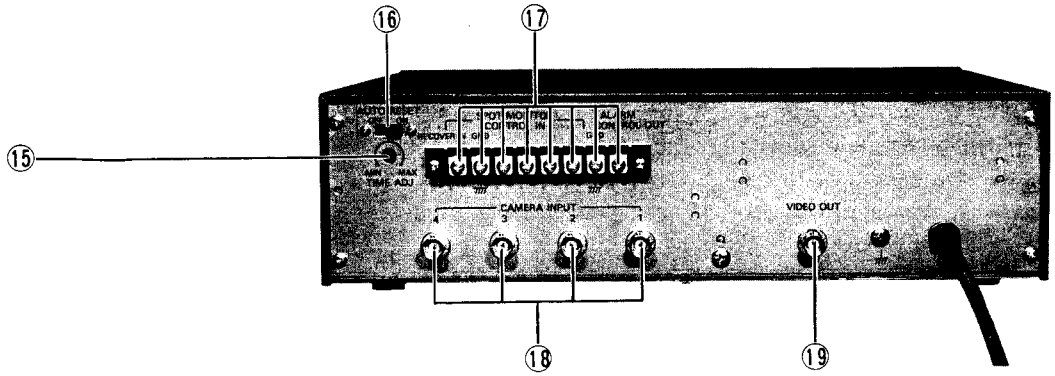
CCTV CAMERA





QUAD UNIT





CCTV CAMERA

1. Lens
   Lens is an optional accessory and standard C mount lens can be used.
   WV-041 : An optional fixed focal length lens can be used.
   WV-046 : An optional automatic iris lens can be used.

2. Power Indicator
   This lamp indicates that the camera is operating.

3. Connector for Automatic Iris Lens
   This connector supplies the power and video signal to the Automatic iris lens. The video signal will control the iris with the servo control circuit in the Automatic iris lens.

4. Camera Mounting Screw Hole
   These threaded holes on the top and bottom covers and are used to mount the camera onto a mounting bracket or tripod. (1/4"-20).

5. Electrical Focus Control (FOCUS)
6. Beam Control (BEAM)
   These controls have been preset at the factory for optimum picture quality. User should not change these control settings as this may result in severe degradation of camera performance or permanent damage to the pick-up tube. Readjustment of these controls should be made only by qualified service personnel. See page 10.

7. Video Output Connector (BNC connector)
   Use a coaxial cable with BNC connector.
   The cable is connected to CAMERA INPUT connector on the quad unit, and carries DC power, vertical drive pulse and horizontal pulses for the camera and video information from the camera to the quad unit.

8. Mechanical Focus
   Adjust the distance from the pick-up tube to the lens by moving the pick-up tube carrier along its optical axis. If required, this allows the minimum working distance between the camera and subject to be reduced. In the case of a zoom lens, focus tracking can be adjusted with this control. See page 10.

QUAD UNIT

10. Power Switch

11. Power Indicator

12. Alarm Indicator (ALARM)
    This indicator starts to blink when a Spot Monitor Control signal is input and turns OFF when the Alarm Reset switch is depressed.

13. Alarm Reset Switch (ALARM RESET)
    This is a push-push type switch which selects the cameras in quad system mode when the switch is pushed and green lamp lights. The switching interval can be adjusted by Auto Reset Time Adjustment (15) from 1 to 60 seconds when the Auto Reset Switch (16) is set to ON position.

14. Camera Selection Switch (CAMERA 1,2,3,4)
    This is a push-push type switch which selects the desired camera. When this switch is pushed, the green lamp lights, and the desired camera is displayed full screen.

15. Auto Reset Time Adjustment (TIME ADJ MIN/MAX)
    The auto reset time can be manually adjusted from 1 to 60 seconds by turning this control.

16. Auto Reset Switch (AUTO RESET OFF/ON)
    This selects the auto reset function;
    ON : The automatic reset function is performed and the automatic reset time can be selected from 1 to 60 seconds by Time Adjustment (15). Set this switch to ON position when the quad unit is connected with VTR which has no reset output signal.
    OFF : The automatic reset function will not be performed. Set this switch to OFF position when the quad unit is connected with the time lapse VTR.
    To reset the picture of the selected camera, use the reset signal from the time lapse VTR.

17. External Control Connection Terminal
(SPOT MONITOR CONTROL IN/ALARM CONTROL OUT)

o SPOT MONITOR CONTROL IN

The terminals of the Spot Monitor Control In are used to connect the intercom or alarm sensors for spot monitoring by shorting terminals 1, 2, 3 or 4.

If terminal 1 is shorted by the intercom or alarm sensors, camera No. 1 is selected and its picture with camera number display is observed (spot monitoring). Camera No. 2, No. 3 or No. 4 can be observed in the same way.

Note : To activate this function, the terminal must be pulled down to 0.2V or less by the intercom or alarm sensors, when tripped.

o ALARM CONTROL OUT

These terminals output a signal for a buzzer, chime, or VTR when a spot monitor terminal is shorted.

o RECOVER

When a camera is selected with the Spot Monitor Control In, the monitor displays only the picture of the selected camera.

To reset the selected camera and to set the quad system mode, use the reset signal from the time lapse VTR.

18. Camera Input Connector (CAMERA INPUT)
BNC type connectors are used to connect the coaxial cables from the specified cameras.

These connectors supply DC power, horizontal drive pulse, vertical drive pulse and deflection selection signal to the cameras, and receive the video information from the cameras.

Note : o Be sure to connect only the specified cameras.

o Connect the camera after making sure that the quad unit is off.

When the camera is connected while the quad unit is on, the camera will not function due to the misconnection protection circuit.

19. Video Output Connector (VIDEO OUT)
A BNC type connector is used to provide the video output signal of the cameras to the monitor or video tape recorder.

INSTALLATION

The mounting bracket can be fixed either on the upper cover or the lower cover of the camera.

Installation on the wall

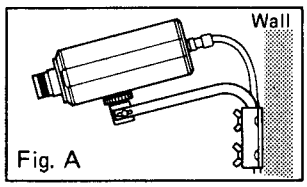


Fig. A

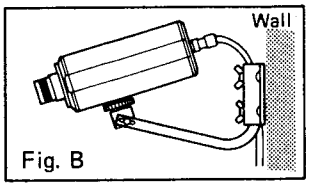


Fig. B

Installation on the ceiling

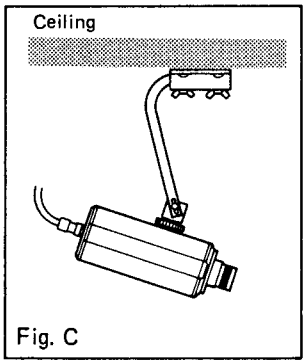


Fig. C

Installation on the shelf or stand

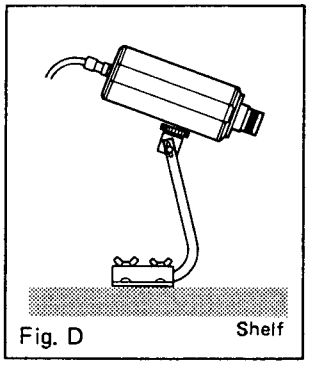
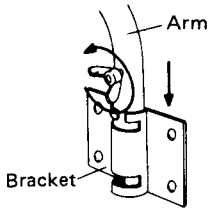


Fig. D

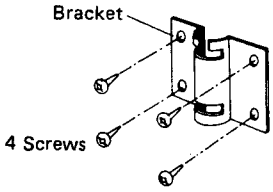
INSTALLATION PROCEDURE

The explanation is for Fig. A, however the same is applied for Figs. B, C and D.

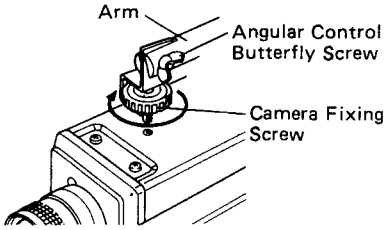
1. Loosen the butterfly screw to remove the bracket from the arm and peel off the back sheet of the adhesive tape on the rear of the bracket.



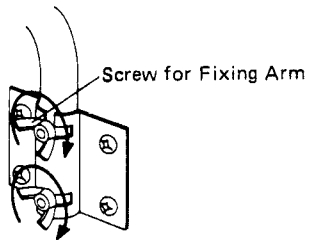
2. Adhere the bracket to the wall and fix it with 4 attached screws. At this time, take care to fix it vertically.



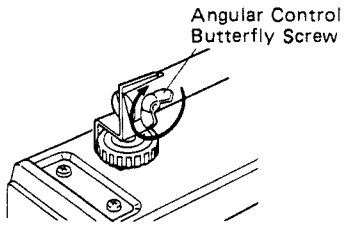
3. Loosen the angular control butterfly screw and then insert the camera fixing screw into the camera mounting screw hole of the camera case and tighten it firmly with the screw.



4. Insert the arm fitted with the camera into the bracket and decide the camera position with the arm directed at an object and tentatively fix the camera with two butterfly screws.

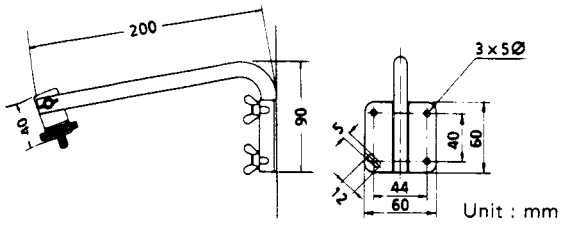


5. Connect the camera and quad unit with the coaxial cable and turn on the power switch of the quad unit and monitor.
6. While viewing the monitor picture, loosen the angular control butterfly screw slightly to fix the upper and lower angles and tighten the screw firmly. Next, tighten the butterfly screws.



7. While viewing the monitor picture, turn the distance ring on the lens to adjust the focus.

o DIMENSION OF MOUNTING BRACKET



o CAUTIONS ON INSTALLATION

The method of installation differs depending on the material of the installation site. Prepare the fitting bolts for installation to material other than wood.

- o For installation onto wooden material, use the attached wood screws to fix the camera.
- o For installation onto iron material, use the nuts and bolts of M4 to fix the camera.
- o For installation onto the concrete wall, use the lead anchors to fix the camera.

LENSES

(1) Selection of Lens

(A) Lens Mounting (Lens Weight: Less than 0.66 lbs./ 0.3 kg)

a) See list of optional Automatic Iris Lens, page 6.
b) "C" mount lens may be used. (Refer to page 7. part 6 for detail.)

(B) Focal length of lens vs. viewing dimensions.

If object size and the distance between the object and the television camera are known, a lens of the proper focal length must be selected.

The proper focal length can be determined by the following equations or from the chart shown in the diagram.

If a specific width must be viewed: $f = 8.8\ L/W$

If a specific height must be viewed: $f = 6.6\ L/H$

f: Focal length of lens (mm)
W: Object width (ft.)
H: Object height (ft.)
L: Distance between object and television camera (ft.)

The length or width of an object, placed at a particular distance that can be picked up with a specific lens, can be calcualted from the following equations or from the chart shown in the diagram.

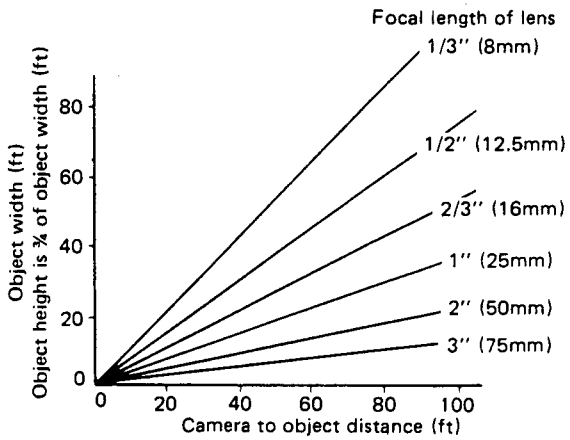
In case object width is important:

$$\text{(Approx.)}\quad W = \frac{8.8L}{f}$$

In case object height is important:

$$\text{(Approx.)}\quad H = \frac{6.6L}{f}$$

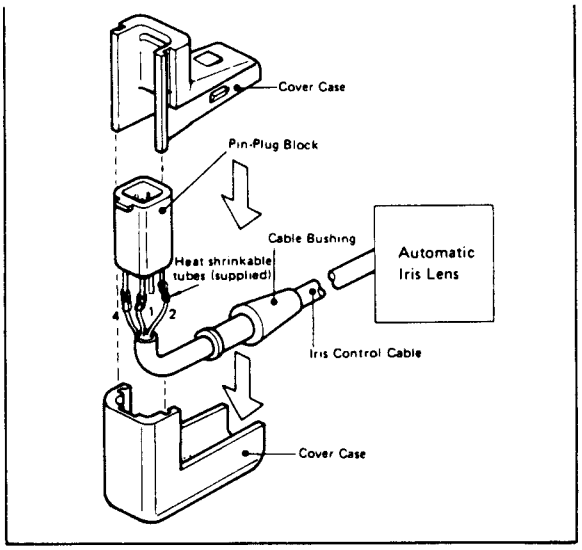
Note : Effective coverage angle will be 5 to 10% less than the following angle because video monitor is generally overscanned 5 to 10%.



(2) Optional Lenses for WV-046

If there is any variation of light, an automatic iris lens must be used because the camera has no internal automatic light compensation.

Specification \ Model		WV-LA8B (Wide angle)	WV-LA16B (Standard)	WV-LA25B (Telephoto)	WV-LA50B (Telephoto)
Focal Length		8 mm	16 mm	25 mm	50 mm
Maximum Aperture Ratio		1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.8
Automatic Light Compensation		1 : 66,000	1 : 66,000	1 : 66,000	1 : 40,000
Angular Field of View	H	58.2°	30.7°	20°	10°
	V	44.9°	23.2°	15°	7.5°
Picture Size		8.8 (H) x 6.6 (V) mm (2/3" Pick-up Tube)			
Minimum Focusing Distance		0.7 ft (0.2 m)	1.6 ft (0.5 m)	2 ft (0.6 m)	3.3 ft (1 m)
Mount		C-mount			
Optional Filter Size		φ 43 mm P= 0.75		φ 49 mm P = 0.75	
Dimensions		φ1-13/16" x 2" (φ46.5 x 51 mm)	φ1-13/16" x1-13/16" (φ46.5 x 46.7 mm)	φ 2-7/16" x 2" (φ 62 x 51 mm)	
Weight		0.35 lbs (160 g)	0.29 lbs (130 g)	0.59 lbs (270 g)	0.64 lbs (290 g)



(3) Installation of Connector for Automatic Iris Lens

- For iris control of the automatic iris lens, the TV camera supplies the power and video signal to the lens according to the following pin assignment.
  - Pin 1 : Power: +9V DC, 50mA Max.
  - Pin 2 : Ground
  - Pin 3 : Open
  - Pin 4 : Video Signal : 0.7Vp-p non-composite (Video input impedance of lens used should be more than 40 kohms.)
- The lens connector (YWRP97P4P) comes with the TV camera and should be connected to the automatic iris lens as follows.

The following installation should be made by qualified service personnel or system installers.

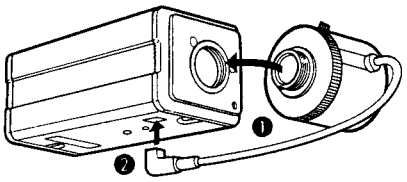
1. Install the cable bushing (supplied) on the iris control cable of the lens as shown in the figure and put the supplied heat shrinkable tubes on the wires of the iris control cable.
2. Solder the wires of the iris control cable at the pins of the pin-plug block according to the following pin assignment and cover the soldered area with the heat shrinkable tubes and heat to shrink.
   - Pin 1 : Power Source
   - Pin 2 : Ground
   - Pin 3 : Open
   - Pin 4 : Video Signal
3. Install the pin-plug block into the cover case.
4. Both cover cases should be positioned to interlock and slide into each other until both cover cases are locked.

(4) Installation of fixed focal length Auto Iris Lens

❶ Mount the Auto Iris Lens by turning it clockwise into the lens mount of the camera.

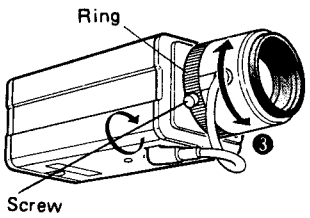
❷ Connect the lens cable to the Auto Iris Lens Connector.

❸ Focus the lens with the black ring in back of the lens and tighten the screw to lock the lens at the focus position.



4 PIN MALE PLUG
PART # YWRP97P4P

#1	Power
#2	Ground
#3	Open
#4	Video



CAUTION :
Do not take off the black cap nor turn the screw. This is the sensitivity control for the lens. For adjustment refer to qualified service personnel only.

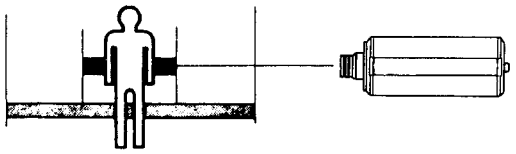
(5) Focusing of Auto Iris Lens

When focusing on objects which are within a few meters (6½ ft.) from the camera, the iris should be fully opened. This can be accomplished by making the objects as dark as possible during initial installation. Then, focus on the objects and finally provide normal illumination.

The reason for this procedure is as follows:

The range over which objects will stay in focus (depth of focus) changes with iris setting. If the

object is brightly illuminated while focusing and the illumination reduces during certain periods of the day, the iris will automatically open to compensate. Now, the depth of focus is narrower and the object might no longer be in focus. If focusing is performed with the iris fully opened, you can be certain that the object will stay in focus regardless of changes in illumination.



(6) Requirements when using Non-Automatic-Iris Lens

If object illumination is always constant, a lens other than an automatic iris lens may be used.
If object illumination changes even slightly when a lens other than an automatic iris lens is used, the video output signal will change considerably and no image may be reproduced in some cases. If all the conditions mentioned below (a~e) are met, then a lens other than an automatic iris lens may be used.

a) Sunlight will not directly come into the lens.
b) Use indoors only. (Not used outdoors)
c) Object illumination is never above 120 foot-candles (1200 lux.). (Lens with an F-number of F16 or below.)
d) Little change in object illumination.
e) Lens has a manual iris.

Set-up of Non-Automatic Iris Lens

Adjust the iris as follows:

a) Adjust object illumination to appropriate level.
b) Check image with a video monitor, and adjust lens iris to the best picture quality. The CONTRAST and BRIGHTNESS controls on the video monitor must be kept in the positions to which they have been adjusted with a television camera having an automatic sensitivity control.
(If you have an oscilloscope, adjust the lens iris to a position where video signal level will be 0.7Vpp.)
c) Object illumination permissible range is plus 20% and minus 75% of the level at which the camera was initially set-up. If object illumination varies in excess of this range, the image may bloom, or fail to show at all.
d) A little adjustment of the CONTRAST and BRIGHTNESS controls on the video monitor due to some change in illumination may be made on the video monitor whenever such adjustment is necessary. (If a motor driven zoom lens is used, the lens iris can be readjusted instead of the monitor controls.)

Note: Please test and check operation and image before final set-up.

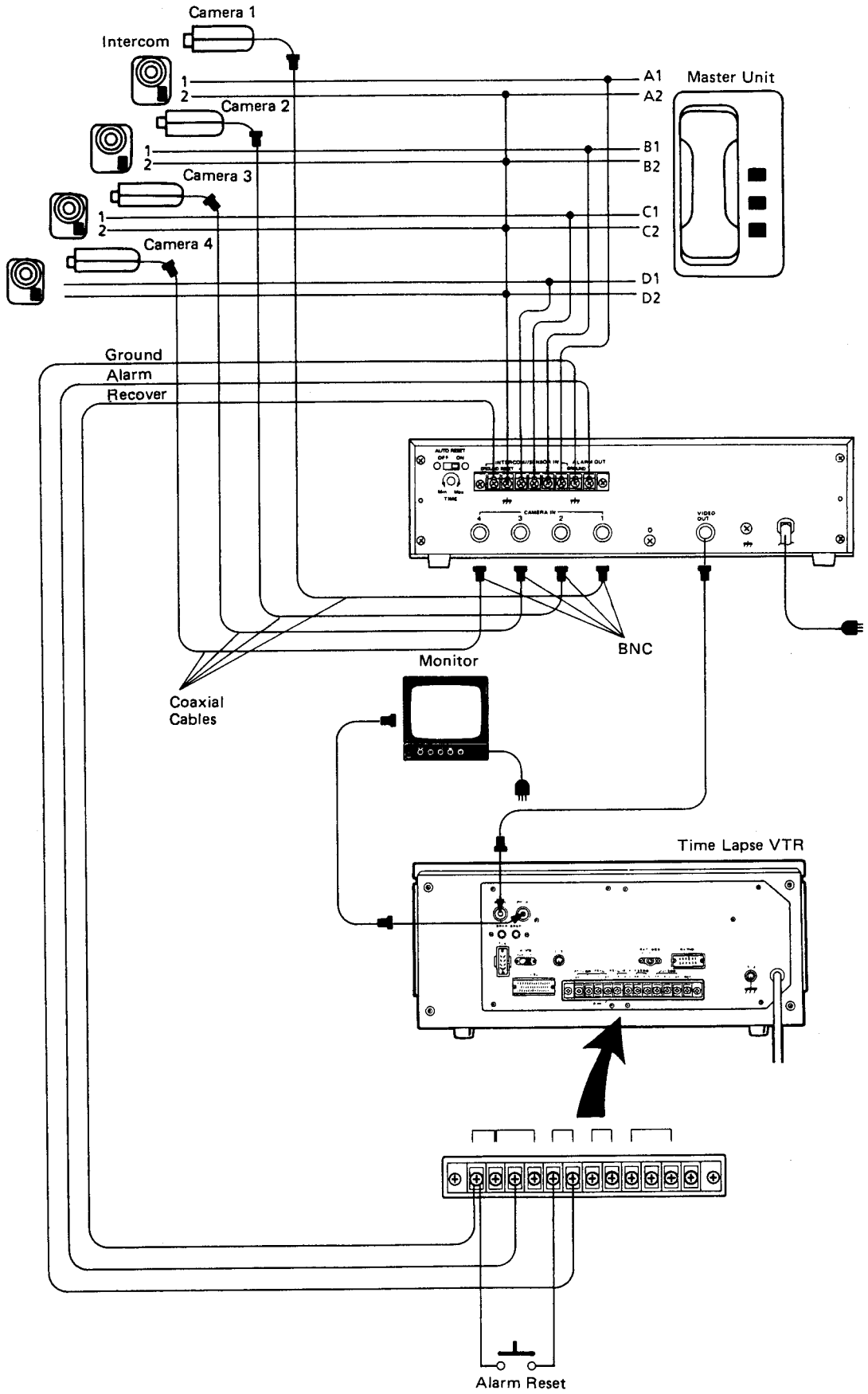
CONNECTIONS

Cautions : 1. Keep the Power ON/OFF Switch in the OFF position during connection.
If the power of the quad unit is ON during connection, the camera will not function due to the protection circuit for the misconnection.
2. Connect only the specified camera (WV-041 or WV-046).
If other cameras are connected, the quad unit will not operate due to the misconnection protection circuit.

System Connection

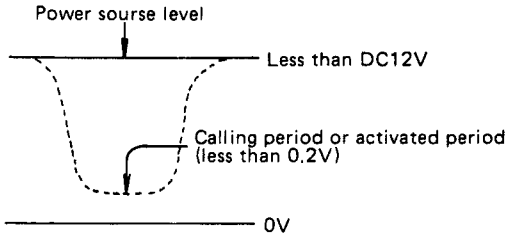
- Connect the single coaxial cables between the cameras and quad unit (CAMERA INPUT).
The maximum cable length is 660ft. (200m) with RG-59/U (3C-2V). (DC R/1000 ft. of inner conductor : Less than 30 ohms)
- Connect the coaxial cable between the quad unit (VIDEO OUT) and the monitor or VTR.
- Connect the wires between the intercoms and master unit.
- Connect the two wires between the master unit and Spot Monitor Control In of the quad unit so that each intercom corresponds to the proper camera.
- Connect the wires between the alarm sensor/switch (door switch) and the Spot Monitor Control In of the quad unit so that the alarm sensor/switch corresponds to the proper camera.
- Connect the wires between the alarm or VTR and the Alarm Control Out of the quad unit.
- Connect the wires between the VTR and Recover In of the quad unit.

Connection for general application



Cautions for Intercomes and Alarm Sensors/Switches

- o The wiring for intercom system and alarm sensor/switches should use two wires.
- o The power source for intercom system and alarm sensors/switch should be less than 12V DC.
- o When the intercom or alarm sensor/switch is activated, the line voltage for intercom or alarm sensor/switch should be DC 0 - 0.2V.

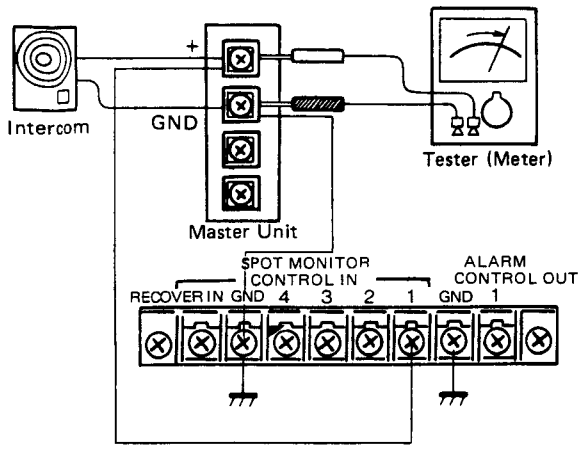


There is a limitation to the wiring length for the intercom system, alarm sensors system and optional units. For example, the wiring length for intercom system is as follows;

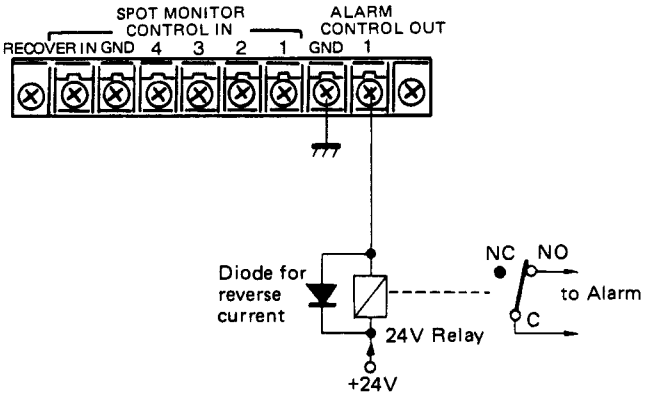
Wires (mm/Q'ty)	Equivalent AWG	SWG	Maximum Wiring length
0.18/12	22	23	490ft (150m)
0.18/20	20	21	820ft (250m)
0.18/30	18	19	1315ft (400m)
0.18/50	16	17	1970ft (600m)

AWG : American Wire Gauge
SWG : British Legal Standard Wire Gauge

- o The polarity for the intercom system and the Spot Monitor Control In of the quad unit should be matched. Check the polarity of the intercom system by tester (meter).



- o Do not connect the intercom system to AC power source.
- o The polarity of the alarm and Alarm Control Output of the quad unit should be matched.
- o The power rating of the alarm should be DC 24V, max. 100mA.
- o If the power capacity of the alarm is less than 100mA at DC 24V, the alarm can be connected at the terminal of Alarm Control Out directly.
- o If the power capacity of the alarm is more than 100mA at DC 24V, the alarm cannot be connected at terminal directly. In this case, the relay circuit should be used for the alarm.



■ PRIORITY OF SPOT MONITOR CONTROL IN

- o The selection of the camera by Spot Monitor Control In is set as first come, first served.
- o The Camera Selection Switch has a first priority against any selectional signal.

■ AUTOMATIC RESET SELECTION SWITCH FOR SPOT MONITOR CONTROL INPUT

- o The quad unit has a built-in automatic reset circuit which automatically resets the spot monitor control input signals such as intercom, alarm sensors etc., approx. 60 seconds after input signal is received.
- o The automatic reset circuit functions according to the spot monitor control input signals as;

1. Alarm Sensors Signal
   The selection of the camera by the alarm sensors signal is automatically reset after approx. 60 seconds and the selection of the camera is returned to the Quad mode.

2. Intercom Signal
   (a) Intercom Communication
   The selection of the camera by the intercom signal is held during intercom communication and it reset to the quad mode after intercom communication is over.

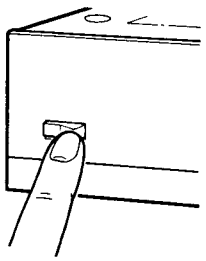
(b) Intercom Calling
The selection of the camera by the intercom calling signal only is automatically reset after approx. 60 seconds and the selection of the camera is returned to the quad mode.

3. Time Lapse VTR
When the Time Lapse VTR is connected to the quad unit, the selection of the camera by alarm sensors/ intercom is automatically reset after approx. 10 seconds-6 minutes and the selection of the camera is returned to the quad mode.

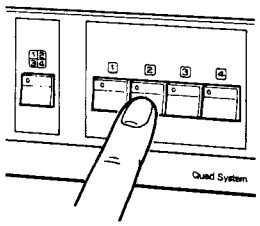
OPERATING PROCEDURE

o Selection of Camera

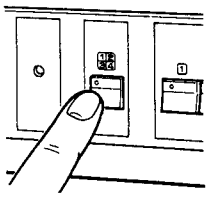
1. Set the Power Switch (POWER ON/OFF) on the front panel to the ON position by depressing once.



2. Push the Camera Selection Switch for selecting the desired camera to observe the picture of it and green indicator lamp lights.



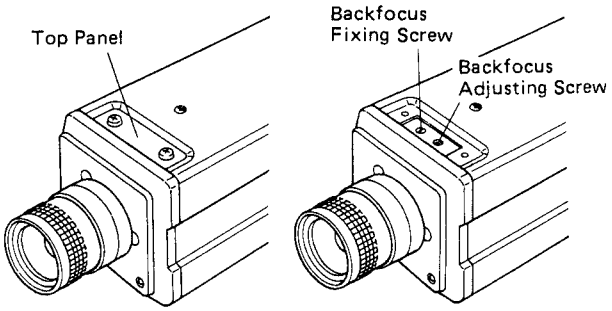
3. Push the Alarm Reset Switch (ALARM RESET) for the quad picture from desired camera.



ADJUSTMENTS

The following camera Adjustments should be made by qualified video service technicians or system installers.

1. Mechanical Focus
Non-standard lenses can be used easily by changing the pick-up tube position with a screw adjustment at the top of the camera. In the case of a zoom lens, focus tracking can be adjusted with this control.
- o Remove two screws on the top side of the camera and remove the top panel.
- o Loosen the holding screw for backfocus adjustment.
- o Turn the backfocus adjustment ring to proper position.



- o Tighten the holding screw and install top panel with two screws.

2. Electrical Focus Control (FOCUS)
Turn the recessed Focus Control on the rear panel slowly until picture on monitor is sharpest.

3. Beam Control (BEAM)
Turn the Beam Control on the side panel fully counterclockwise. Then turn it clockwise until the highlights in the picture are just resolved, or discharged and advance the control slightly in the same direction.

CAUTION :
It is recommended to use Newvicon camera WV-046 with an automatic iris lens.
If a lens with manual iris must be used, picture level should be adjusted by iris ring in quad mode.

CIRCUIT DESCRIPTIONS

1. Outline

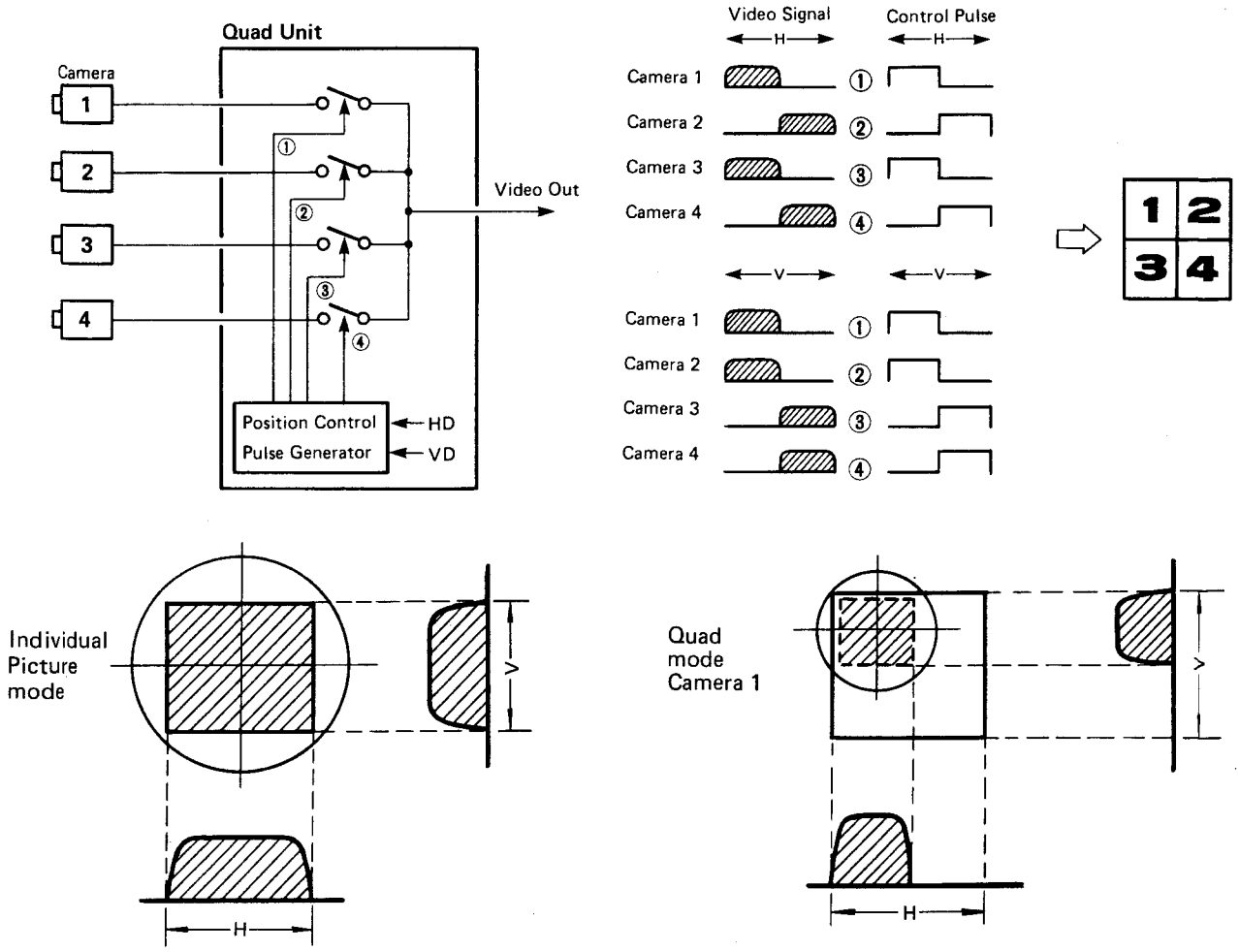


Fig. 1-1

The camera WV-041/WV-046 sends the video signal to the quad unit WJ-400.
The quad unit WJ-400 sends following signals to the camera WV-041/WV-046.

1.DC power (Approximately + 13V at camera side).
2.Horizontal drive pulse.
3.vertical drive pulse
4.Individual/quad control signal.

When the individual pictual made is selected,the horizontal and vertical deflection signal are generated in the camera by the horizontal and vertical drive (HD and VD) pulses sent from the quad unit and the electro in pick-up tube is scanned as shown below.The video signals are sent from the cameras connected to the quad unit and one of the camera signals selected according to the selection of individual camera.

When the quad mode is selected,the pulse of HD and VD pulses sent from the quad unit to each camera is shifted and the individual/quad control signal from the quad unit doubles the horizontal and vertical deflection signal generated in the camera.As a result,the scanning area for camera 1 is expanded as shown in the illustration.
The video signals from the four cameras connected are sent to the quad and each corner picture is selected by the position control pulse. The selected corner picture is mixed and quad picture is made.

2. Camera WV-041/WV-046

2-1 Misconnection Protector Circuit

When the Power Switch on the front of Quad unit WJ-400 is turned ON, approx. 4V is generated in the power circuit of Quad unit momentarily and supplied to astable multivibrator Q101 - Q103 through the coaxial camera cable, and the multivibrator generates a pulse whose frequency is approx. 40kHz. This pulse appears on the power line since the power line has high impedance. When the misconnection protector circuit in the Quad unit detects the pulse generated by the multivibrator, the power circuit in the Quad unit supplies the DC power to the camera (approx. + 13V DC measured at camera side) constantly through the coaxial camera cable. Therefore, even if the Quad unit WJ-400 is connected with another type of CCTV cameras or other products by mistake, the DC power is not supplied from the Quad unit since no pulse is supplied to its misconnection protector circuit from other products.

When the potential at the collector of Q107 in the + 9V DC regulator circuit exceeds + 5.1V, D101 and Q104 turn ON and Q103 OFF. By turning OFF Q103, the astable multivibrator stops its oscillation, and no pulse appears on the power line.

2-2 Impedance Converter/ + 9V DC Regulator Circuit

Approx. + 13V DC supplied from the Quad unit is fed to + 9V DC regulator consisting of IC101 (a) and Q107 through impedance converter Q105/Q106, which converts the impedance of power line from high to low.

IC101 (a) amplifies the error between the 5.1V zener (D102) reference and potential at pin 2 of IC101 (a) potential and forwards it to Q107.

If the Q107 collector potential changes the pin 2 of IC101 (a) potential also change, and a voltage change appears at pin 1 of IC101 (a).

The change controls the emitter current of Q107 in the direction which is same as the voltage change at Q107 collector. In this way, the resistance between the emitter and collector of Q107 changes and + 9V kept constant.

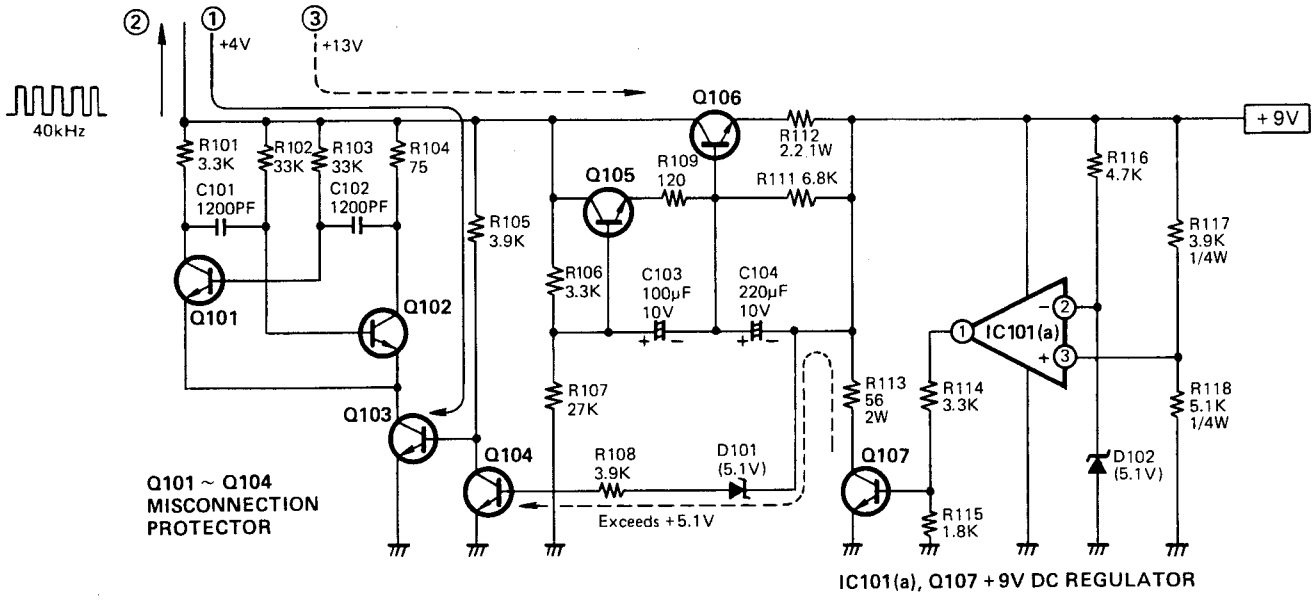


Fig. 2-1 Misconnection Protector/+9V DC Regulator Circuit

2-3 Video Amplifier Circuit

The video amplifier circuit of Q1 through Q10 has a current gain of approx. 92 dB. When the current from target of a pick-up tube is approx. 0.2μ A, the output is 0.7Vp-p/75 ohms.
Transistor Q1 is a low noise FET with a high input impedance. The vidicon target current is converted to voltage in R4/R5 and amplified by this FET.
The video amplifier consisting of Q2 through Q5 amplifies the video signal and 1.4Vp-p signal is obtained at the collector of Q5. Feedback resistors of R18 and R19 are used for extending the frequency response of the amplifier.
Feedback resistor R6 and capacitor C12 from the collector of Q3 feedback the signal to the gate of Q1 and thus changes the input impedance of Q1 and improves the video frequency response.
D1 and D2 are a diodes for temperature compensation.
When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to the quad mode, the high level is sent from the camera/quad picture control circuit to the base of Q16 turning Q16 ON. Therefor video signal increased by expanding the deflection is decreased.

2-4 Process Amplifier Circuit

The video signal amplified by Q1 - Q5 is sent to the clamp circuit Q6.
The BL pulse is applied to its base from IC301 (d).
When this positive BL pulse is applied to the base of Q6, the BL level of video signal at the base of Q7 assumes the same voltage as emitter of Q6.
The emitter follower Q7 in the next stage has a high input impedance, and thus a large time constant. Therefore, the black level of video signal is clamped to a specific voltage during the horizontal and vertical blanking periods.
The low level portion of video signal at the emitter of Q7 is clipped by Q15 and the pedestal level is set. The clip level is set by VR1 (PEDESTAL).
D4 is for temperature correction for Q15.
The video signal whose pedestal is set is supplied to white suppressor Q8. When the video signal level at the base of video output Q10 exceeds 2Vp-p, Q8 is turned ON and video signal level of more than 2Vp-p is suppressed.
At the base of Q10, the return pulse from the collector of Q301 is mixed with the video signal.
The video signal with the return pulse runs through video output Q10 and camera cable to the Quad Unit, and it is halved in level at the junction point of R48 and R49 (Input impedance of Quad Unit is 75 ohms). This means that the video signal is suppressed at 1Vp-p.
In case of Newvicon camera WV-046, the video signal at the emitter of Q7 is fed to the automatic iris control lens through the lens connector for controlling the lens iris. Q9 in the WV-046 is a gamma correction transistor.In the individual camera mode, the high level is sent to the base of Q13 turning it ON.In the quad mode,.the low level is sent to Q13 to turn it OFF. As a result, the video signal sent to the automatic iris control lens is increased in order to reduce the iris opening and the video signal level which is increased at the quad mode by expanding the scanning size.
Although the video signal at the emitter of Q10 goes to the Quad Unit through R48, C21 and camera cable, a drive pulse comes from the Quad Unit to the camera via same line.
Q11 separates the vertical (V) and horizontal (H) drive pulse from the multiplexed signal of video signal and, V and H drive pulse. The video signal (A) at the emitter of Q10 is applied to the emitter of Q11 and multiplexed signal (B) to its base. Therefore, Q11 is turned ON during the V and H drive pulse duration and the negative V and H drive pulse is (C) are obtained at the collector of Q11.
The negative V and H drive pulses are sent to the pulse generator circuit through buffer Q12.

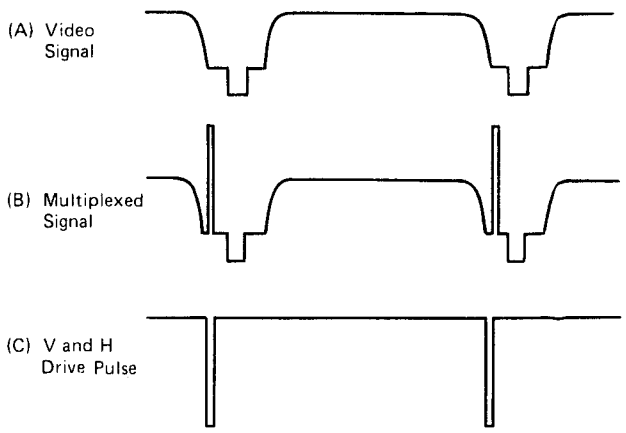


Fig. 2-4

2-5 Vertical Deflection Circuit

Transistor Q202 is switched by the vertical blanking (V.BL) pulse (A) supplied from the V. blanking generator circuit and generates sawtooth signal (B).

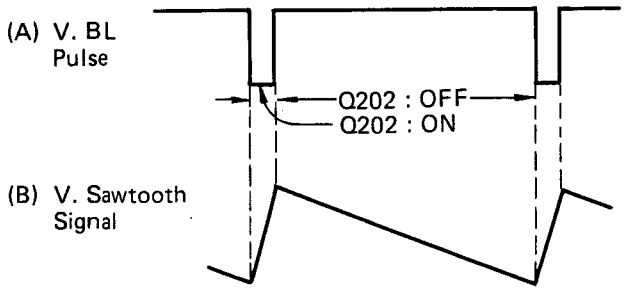


Fig. 2-5

The sawtooth signal is generated by time constant consisting of C202, R204 and VR201 (V. SIZE-1).
The sawtooth signal is fed to amplifier IC10 (b), where it is amplified.The amplified signal is routed into the vertical deflection coil L201. The amplified signal is fed back to pin 5 of IC10 (b) to provide linearity correction.
When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to the quad mode, the high level is sent from the camera/quad picture control circuit to the base of Q203 and Q203 is turned ON. Therefor, the vertical sawtooth signal level becomes double.VR201 (V.SIZE-1) is a control for adjusting the V.scanning size at the individual camera mode and VR205 (V.SIZE-2) for quad mode.

2-6 Horizontal Deflection Circuit

The horizontal blanking (H.BL) pulse (A) from the H.blanking generator circuit is supplied to H. deflection output Q205.
Q205 is switched by the H.BL pulse, the collector current of Q205 resonates with C205 and horizontal deflection coil L201 and the resultant horizontal sawtooth current (B) is supplied to L201. D201 is a damper diode.
VR203 (H.SIZE-1) is a control for adjusting the H. scanning size at the individual camera mode.

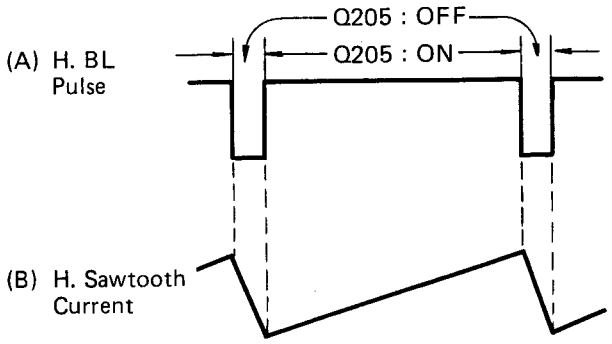


Fig. 2-6-1

When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to the quad mode, the high level of quad control pulse is sent from the camera/quad picture control circuit to the base of Q207 and Q207 and Q206 are turned ON.As a result,the horizontal sawtooth signal level becomes double.VR204 (H.SIZE) adjusts the H. scanning size at the quad mode.

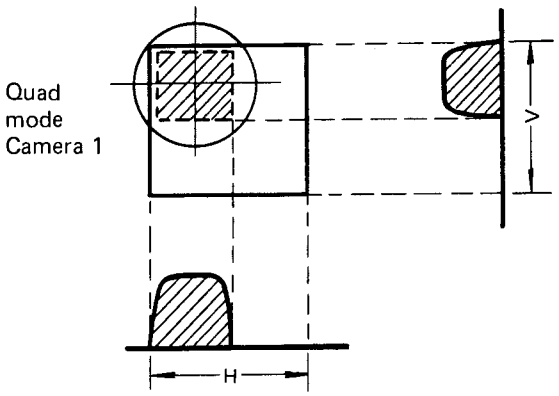


Fig. 2-6-2

2-7 Pulse Generator Circuit

◆ **Vertical Blanking Generator Circuit**

The vertical (V) and horizontal (H) drive pulse (A) are supplied from the pulse separation circuit to inverter IC302 (e). The inverted pulse (B) is supplied to the VD detect circuit consisting of R304, C303 and IC302 (d), where the VD pulse is detected.
The VD pulse (C) obtained at pin 10 of IC302 (d) is fed to the vertical blanking (V.BL) generator circuit IC303 (a) The V.BL pulse (D) obtained at pin 6 of IC303 (a) is fed to the vertical deflection circuit through amplifier Q201.

◆ **Camera/Quad Picture Control Pulse Generator Circuit**

The negative vertical blanking pulse (E) is supplied from the vertical blanking generator circuit to the delay circuit consisting of R307, C307 and IC302 (e).

The delayed pulse (F) is fed to pin 2 of NAND gate IC301 (a). The vertical drive pulse (C) is supplied from the VD detect circuit to pin 1 of NAND gate IC301 (a).

When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to the quad mode, the pulse (G) obtained at pin 3 of NAND gate IC301 (a) is fed to the camera/quad control circuit IC303 (b) and the high level obtained at pin 10 of IC303 (b) is sent to other circuit.

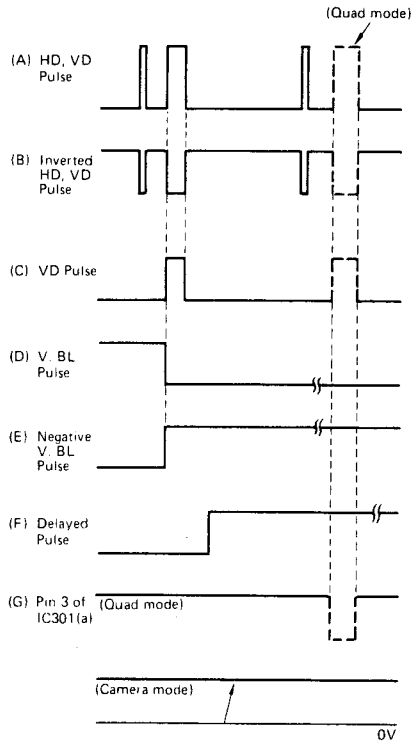


Fig. 2-7-1

(For WV-046)

The low level obtained at pin 9 of IC303 (d) is feed to the ALC control circuit and control the video signal.

When the Camera Selection Switch on the front of Quad Unit WJ-400 is set to the individual camera mode, the pulse (G) is not obtained at pin 3 of IC301 (a) and it becomes high level. The high level is fed to the camera/quad control circuit IC303 (b) and the low level obtained at pin 10 of IC303 (b) is sent to other circuit.

◆ **Return Pulse Generator Circuit**

The vertical (V) and horizontal (H) drive pulse (A) are supplied from the pulse separation circuit to inverter IC302 (e). The inverted pulse (B) is supplied to pin 11 of return pulse generator IC304 (b). The return pulse (C) is obtained at pin 10 of IC304 (b) is fed to the return pulse mix circuit Q10 through width control IC302 (c) and amplifier Q301. The controlled return pulse (D) is mixed with the video signal.

◆ **Horizontal Blanking Generator Circuit**

The return pulse (C) is supplied from the return pulse generator circuit to pin 4 of horizontal blanking generator IC304 (a). The horizontal blanking (H.BL) (E) obtained at pin 7 of IC304 (a) is fed to monostable multivibrator consisting of IC302 (a) and (b), which generates the pulse (F). The pulse (F) obtained at pin 2 of IC302 (a) is fed to AND gate D303. The H.BL pulse is supplied from pin 7 of IC304 (a) to D303 through delay circuit R313/C317. The erase pulse (H) is made by pulse (F) and pulse (G) and sent to pin 5 of IC303 (a). As a result, the unwanted pulse on the H.BL pulse (E) is removed and the H.BL pulse (I) obtained at pin 7 of IC304 (a). It is fed to the high voltage circuit, blanking mix circuit and horizontal deflection circuit.

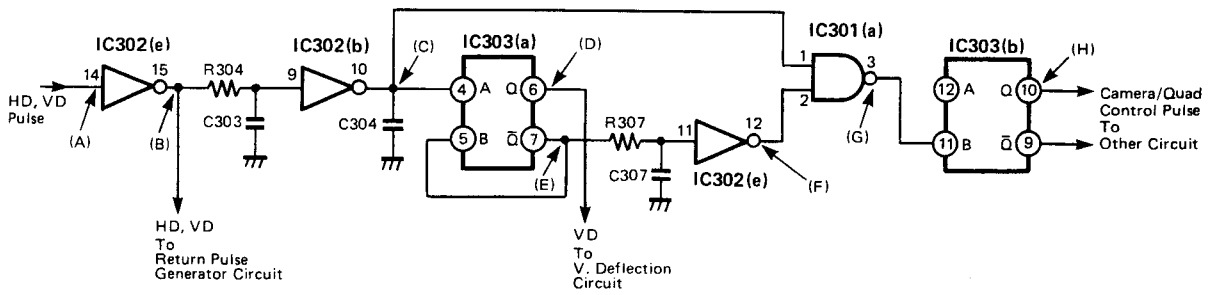


Fig. 2-7-2 Pulse Generator Circuit

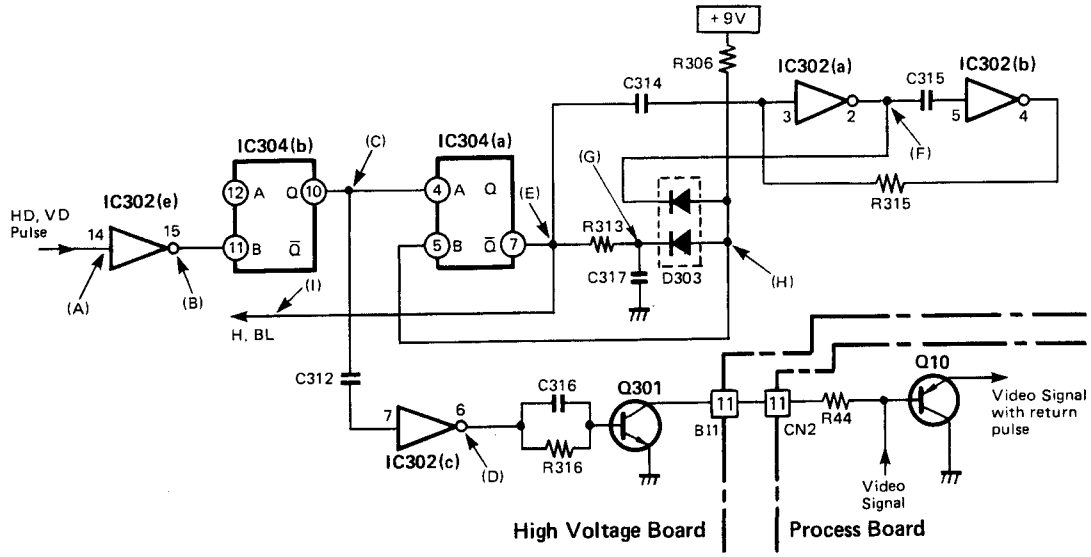


Fig. 2-7-3 Pulse Generator Circuit

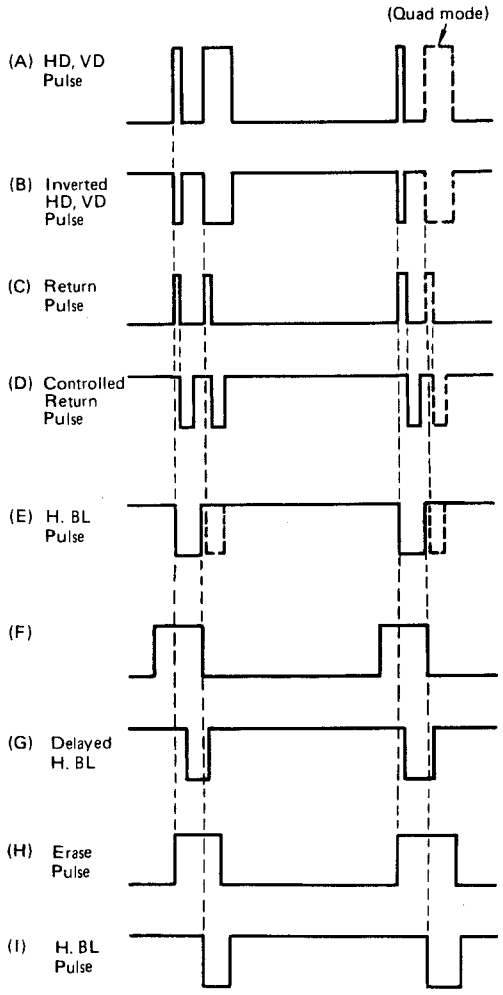


Fig. 2-7-4

◆ Blanking Mix Circuit

The horizontal blanking (H.BL) pulse and the vertical blanking (V.BL) pulse supplied to pins 13 and 12 of IC301 (d) respectively are mixed together and composite BL pulse is obtained at pin 11.

The composite BL pulse is supplied the cathode of pick-up tube through amplifier Q403 to eliminate the retracing line of scanning.

The composite BL pulse is also sent to the clamp circuit Q6.

2-8 High Voltage Circuit

This circuit uses a DC-DC converter to generate high voltages needed for the pick-up tube.
The H.BL pulse out of pin 7 of IC304 (a) triggers the "T" flip-flop consisting of IC301 (b) and IC301 (c) which divides the pulse by 2, and pulse of opposite polarities are generated at pins 8 and 6.
The purpose of dividing the H.BL pulse is to prevent switching noise from getting into the video signal.
The divided pulses enter the driver circuit composed of Q401 and Q402, and then are raised in voltage by T401. The pulses from the secondary winding of T401 are then rectified by diodes D401 through D406 into high voltages for the pick-up tube electrodes.
The following voltage are applied to the pick-up tube electrodes.

G6 :	Approximately 500V
G4 :	Approximately 42V
G2, G3, G5 :	Approximately 300V
G1 :	Approximately -20V

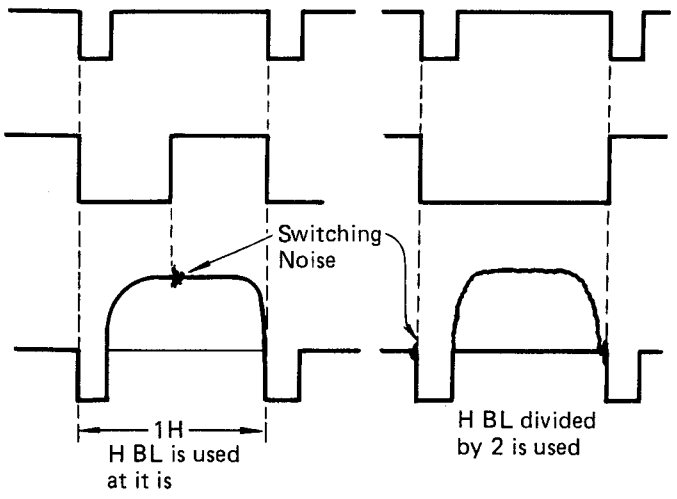


Fig. 2-8

D407 and Q406 protects R431 from burning when the heater of pick-up tube becomes short-circuit.
In the quad mode, the focus is shifted slightly by turning ON Q404 in order to minimize the jitter.

2-9 Automatic Light Control (ALC) Circuit for WV-041

The video signal taken out of the emitter of Q7 is applied to rectifier and voltage doubler consisting of C22, C23, D6 and D7 where it is converted into a DC voltage. If a large input signal is applied (that is, if the image contrast increases), the base of Q14 increases, and the collector voltage of Q14 decreases.
The collector voltage of Q14 runs through R2 and R3 to apply the DC voltage to the vidicon target. When the collector voltage falls, the target voltage also falls and less signal is obtained out of the vidicon. If the image contrast decrease, the reverse operation takes place.
The video signal level is set by adjusting the target voltage with VR403(TARGET-1) .
In the quad mode, the scanning side on the vidicon is expanded and video signal from the vidicon is increased. The high level is sent to the base of Q405 to turn it ON in the quad mode and the video level is compensated by VR402(TARGET-2).

3. Quad Unit WJ-400

3-1 Power Board

3-1-1 + 30V Regulator Circuit

The line AC is supplied to the primary winding of the power transformer T101 through the power switch SW101 and fuse F101.
About 30V AC obtained at the secondary winding of the T101 is fed to rectifier D1, D2, D3 and D4, and rectified + 40V is obtained at the cross point of cathode of D1 and D4.
+ 40V DC is supplied to pin 3 of + 30V DC regulator IC1, and regulated + 30V DC is fed to other circuit. + 30V DC is set by VR1 (+ 30V ADJ).

3-1-2 + 9V Regulator Circuit

The line AC is supplied to the primary winding of the power transformer T101 through the power switch SW101 and fuse F101.
About 10V AC obtained at the secondary winding of the T101 is fed to rectifier D5, D6, D7 and D8, and rectified + 13V is obtained at the cross point of cathode of D5 and D8.
+ 13V DC is supplied to pin 1 of + 9V DC regulator IC2, and regulated + 9V DC is fed to other circuit.

3-1-3 Reset/Pulse Generator Circuit

The AC power is fed to monostable multivibrator IC3 (b) and high (H) level obtained at Q output (pin 10) of IC3 (b) is fed to the character generator and camera picture position circuit in the Sync board, and reset the character generator and camera picture position.
The H level is also fed to the base of Q1 and Q1 is turned ON. The AC power is fed to the base of switching transistor Q2 switching ON and OFF. The switching pulse obtained at the collector of Q2 is fed to other monostable multivibrator IC3(a). The H level obtained at Q output (pin 6) of IC3 (a) is fed to the blanking generator circuit in the Alarm board for generated blanking pulse. The low level obtained at $\overline{Q}$ output (pin 6) of IC3 (a) is fed to the quad/camera picture control and the alarm control circuit in the Alarm board and reset the quad picture and alarm control.

3-2 Camera Power Board

3-2-1 Constant Current Circuit

A oscillator inside IC101 oscillates approx. 30kHz and this pulse is fed to a pulse width modulation (PWM) circuit inside IC101. The width of switching pulse modulated corresponds to the voltage drop of the current detector R108 and VR101 (CURRENT ADJ) setting, and then fed to the base of switching transistor Q101 through pin 4 of IC101 and the drive transistors Q103 and Q102.
The variation of load current due to coaxial cable length is detected by R108 as a voltage change. In case the load current decreases, the voltage between pin 5 and pin 8 of IC101 (i.e, input voltage of differential amplifier) decreases, and the output voltage of the differential amplifier decreases so that the high (H) level duration of modulated pulse becomes wider and narrower low (L) level. This switching pulse is then fed to the switching transistor Q101 to increase the DC voltage at the cross point of L101, C102 and R108 in order to increase the current flowing through R108. In case the load current increase, the reverse operation takes place.
In this way, the current flowing into the camera through R108 is kept constant regardless of coaxial cable length between the quad unit and camera.

3-2-2 Misconnection Protection Circuit

The impedance converter Q104 converts the impedance of power line from low to high so that the misconnection protection circuit is performed precisely.
When the power switch on the Quad Unit WJ-400 is turned ON, approx. + 6V DC is supplied to the camera through Q104 momentarily after turning ON the power switch by the starter circuit inside IC101. In the camera, approx. 40kHz pulse in generated by the + 6V DC and multiplexed on the power line.
This pulse is supplied to the misconnection protection circuit inside IC101 through pin 10 of IC101 to turn ON Q104.
As a result, the DC power corresponding to the coaxial cable length is supplied from the constant current circuit continuously through R108.

If this power supply is connected to other CCTV cameras or products by mistake, no pulse is fed back to the starter circuit and Q104 becomes OFF.
Therefore, no DC power is supplied through Q104 to the connected products in order to protect them.
When the coaxial cable length between the Quad Unit and camera is extended more than its specification or the coaxial cable is disconnected in the operating condition, the DC voltage at the emitter of Q104 increases and D108 turned ON. The high voltage is sent to the base of Q105 and Q105 is turned ON. The low level obtained at the collector of Q105 is fed to the open protection circuit inside IC101 in order to cut off the DC power. As a result, no DC power is supplied to the camera.
The about +9V DC voltage obtained at pin 6 of IC101 is fed to the base of Q106 and Q106 turned ON. The low level obtained at the collector of Q104 is fed to the cable compensation circuit in the Process board and controlled oscillator (VCO) IC101.

3-2-3 +9V Regulator Circuit

+30V is supplied from +30V regulator circuit to pin 3 of IC501 and regulated +9V obtained at pin 1 of IC501 is fed to the other circuit.

3-3 Process Board

3-3-1 Cable Compensation Circuit

The return pulse made by the horizontal drive pulse (sent from the Quad unit) in the camera and mixed with the video signal is supplied through pin 3 of CN9B to the pulse separator Q101 where the horizontal rate return pulse is separated.

The separated pulse is fed to inverters IC102 (a) and IC102 (f). The horizontal (H) pulse thus detected at pin 12 of IC102 (f) is fed to pin 3 of phase comparator IC101. The HD1 pulse is applied through pin 1 of CN7B to pin 14 of phase comparator IC101 where it is compared with the H pulse supplied to pin 3 and a pulse whose width corresponds to the phase difference between two pulses is generated at pin 9. The pulse is converted to the DC voltage by the low pass filter consisting of R109, C106 and C107. This DC voltage is fed to pin 13 of voltage controlled oscillator (VCO) IC101 and oscillates 15.75kHz (USA standard) or 15.625kHz (CCIR Standard).
The low (L) level is supplied from the Power board to pin 5 of VCO IC101 through pin 1 of CN9B and starts oscillation inside IC101.
The 15.75kHz or 15.625kHz pulse is fed to pin 6 of IC103 (b) through IC102 (d) as HD pulse.
The VD1 pulse is applied through pin 5 of CN7B to pin 5 of IC103 (b) where it is mixed with the HD pulse. The mixed pulse obtained at pin 4 of IC103 (b) is fed to pin 2 of pulse control IC103(a).
The L level is supplied to pin 11 of inverter IC102 (e) and the H level obtained at pin 10 of IC102 (e) is fed to pin 1 of IC103 (a).
The HD and VD mixed pulse obtained at pin 3 of IC103 (a) is fed to the camera through buffers Q102 and Q103, Power board and camera cable.
In the camera, the return pulse is made from the HD pulse.
In this way, a phase lock loop (PLL) circuit is made, and the phase of HD pulse sent to the camera is controlled in order to generate the return pulse whose relative phase matches that of HD pulse from the sync generator.
It is used to eliminate a horizontal phase difference between cameras caused by a difference in cable length when mixing the output of multiple camera.

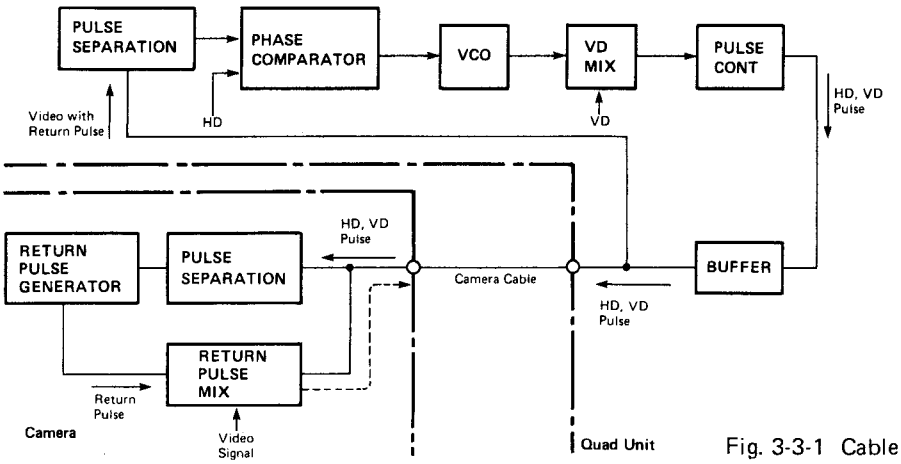


Fig. 3-3-1 Cable Compensation Circuit

3-3-2 Video Processing Circuit

The video signal with HD and VD pulse (A) is supplied from the video input connector to the clamp circuit Q107 through pin 3 of CN9B and buffers Q104 and Q106 where the blanking level of the video signal is clamped by the clamp pulse (B) fed from the Power board through buffers IC102 (b) and (c) to the base of Q107 and the blanking level is set to the DC voltage at the emitter of Q107. The video signal whose blanking potential is set is sent to the camera position select circuit through buffer Q108.

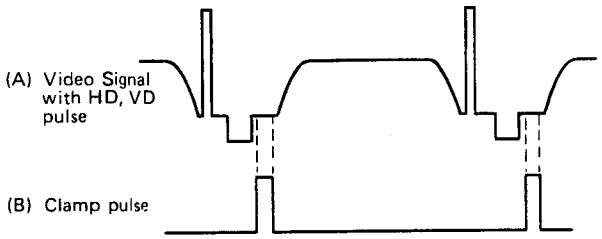
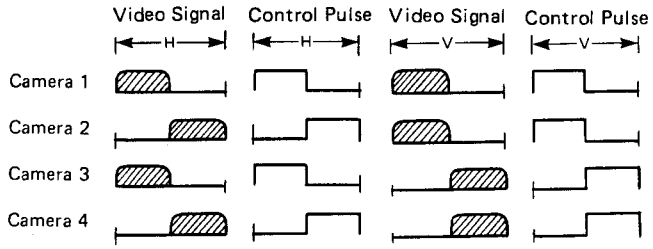


Fig. 3-3-2

Quad mode



3-3-3 Camera Position Select Circuit

The video signals are supplied from the video processing circuit to pins 1, 3, 11 and 9 of IC502 respectively.

For example, when the Camera Selection Switch on the front of Quad Unit WJ-400 is set to the camera 1 position, the potential at control terminals pin 6 of IC502 and IC503 becomes high (H) level and the terminal pin 9 is connected terminal pin 8 of IC502 and IC503 respectively.

Therefore the video signal of camera 1 is fed to the video output circuit through IC502 and IC503.

When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to the quad mode, the control pulses are supplied from the position control pulse generator circuit in the Sync board to control terminals pins 13, 5, 12 and 6 of switcher IC502 and IC503 through pins 3, 4, 5 and 6 of CN6B and inverter IC501 respectively and when the control pulses becomes H level, the terminal pins 1, 3, 11 and 9 are connected terminal pins 2, 4, 10 and 8 of IC502 and IC503 respectively.

There fore, the video signals obtained at pins 2, 4, 10 and 8 of IC503 and mixed video signals. The mixed video signal is fed to the video output circuit.

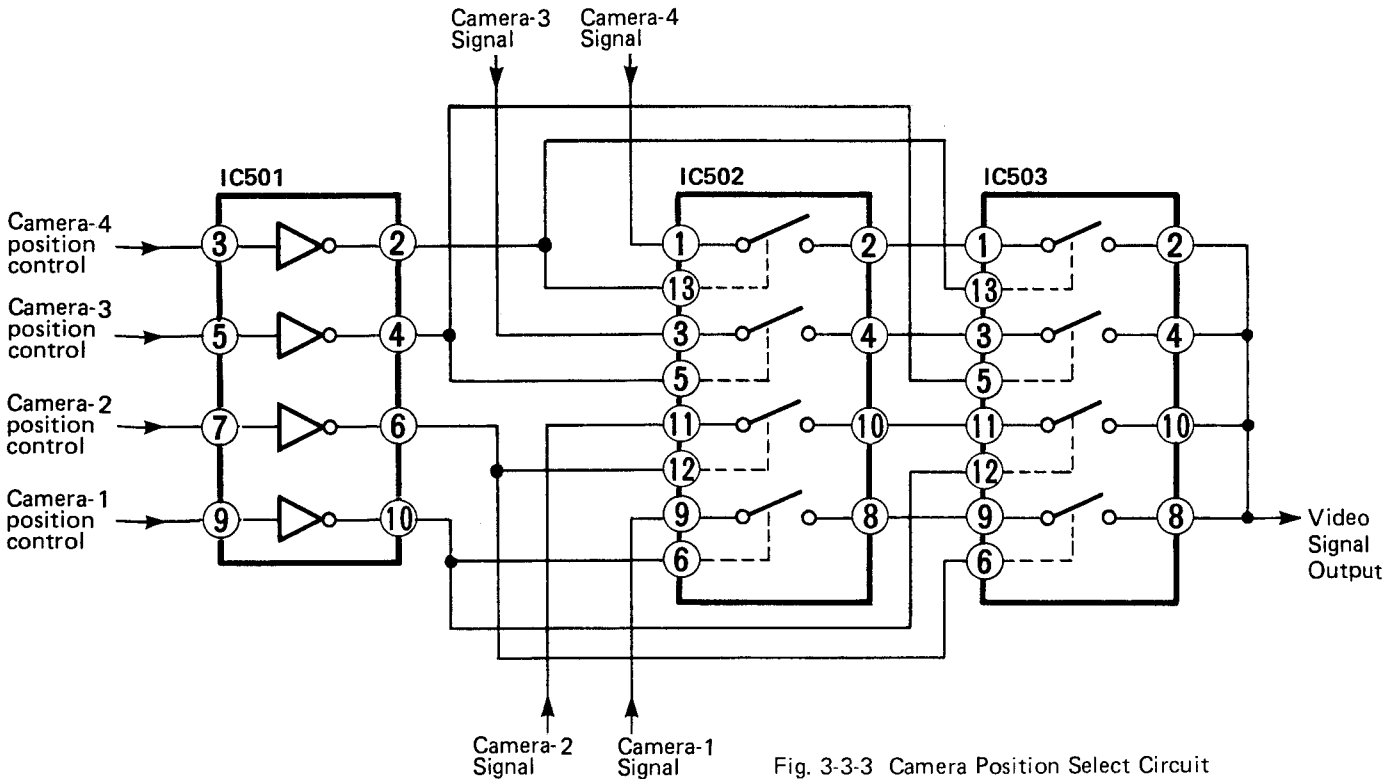


Fig. 3-3-3 Camera Position Select Circuit

3-3-4 Video Output Circuit

When the Camera Selection Switch on the front of Quad Unit WJ-400 is set to camera 1 position, the character signal is supplied from the character generator circuit in the Sync board to the emitter of Q503 through buffer Q501.
The video signal is supplied from the camera position select circuit to blanking cleaner Q502 to eliminate the noise during the blanking period and the video signal is fed to the emitter of Q503. The sync signal is supplied from the pulse generator circuit in the Sync board to pin 2 of CN17 through inverter Q505. The video signal is mixed with sync signal and then mixed signal is fed to the video output connector through pin 2 of CN17.
When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to quad position, the character signal is not supplied from character generator circuit in the Sync board to the emitter of Q503.
The only quad video signal is supplied from the camera position select circuit to blanking cleaner Q502 to eliminate the noise during the blanking period and the quad video signal is fed to the emitter of Q503. The quad video signal is fed to pin 2 of CN17 through amplifier Q503, buffers Q504 and Q506 and mixed with the sync signal from the pulse generator circuit in Sync board. The mixed quad video signal is fed to the video output connector. The black level of video signal is controlled by Q508 and VR1 (PEDESTAL).

3-4 Alarm Board

3-4-1 Spot Monitor Control Circuit

When the Power Switch on the front of Quad Unit WJ-400 is turned ON, potential inputs pins 12 and 13 of OR gate IC2 (d) becomes low (L) and output pin 11 of OR gate IC2 (d) becomes L. The L level is sent to DATA (D) input (pin 5) of D flip-flop IC1 through inverters IC5 (c) and (d).
On the other hand, potential inputs (pins 2, 1, 5, 6, 8 and 9) of OR gate IC2 (a), (b) and (c) become L and outputs (pins 3, 4 and 10) of OR gate IC2 (a), (b) and (c) become L. The L level is sent to input (pins 8, 1 and 6) of AND gate IC4 (c), (a) and (b) through inverters IC5 (a) and (f), and IC5 (b) and (e). Another inputs (pins 9, 2 and 5) of AND gate IC4 (c), (a) and (b) become high (H). The outputs (pins 10, 3 and 4) of AND gate IC4 (c), (a) and (b) becomes L. The L level are fed to D inputs (pins 13, 12 and 4) of D flip-flop IC1.
When the Camera 1 of Spot Monitor Control Input terminal on the rear of Quad Unit WJ-400 is grounded, the L level is fed to the base of Q15 and Q15 is turned OFF.
The H level is obtained at the collector of Q15 is fed to input (pin 12) of OR gate IC2 (d). The potential at other input (pin 13) of OR gate IC2 (d) becomes L. The H level obtained at output pin 11 of OR gate IC2 (d) is fed to D input (pin 5) of D flip-flop IC1 through inverters IC5 (c) and (d). The H level is obtained at Q output (pin 7) of D flip-flop IC1 is fed to the Sync board.
On the other hand, potential input (pins 2, 1, 5, 6, 8 and 9) of OR gate IC2 (a), (b) and (c) remains L, Q output (pins 15, 10 and 2) of D flip-flop IC1 stays L level.
As a result, the camera 1 video signal is supplied to the video output connector.
At the same time, the H level at pin 7 of IC1 is fed to D1 on the switch board through power switching Q4 to light.
The L level is supplied from the quad/camera picture control circuit to CLOCK (CLK) input (pin 9) of IC1 and the 1/2 VD pulse is supplied from the quad/camera picture control circuit to CLEAR (CLR) input (pin 1) of IC1 and reset to D flip-flop IC1. The L level obtained at Q outputs (pins 15, 10, 2 and 7) of IC1 are fed to the Sync board.
At the same time, Q output of D flip-flop IC11 (a) becomes H level and it is sent to the Sync board.
As a result, the quad video signal is supplied to the video output connector. (It is described in 3-4-5 Quad/Camera Picture Control Circuit.)
When the Camera Selection Switch on the front of Quad Unit WJ-400 is set to the camera 1 position by pressing the SW1 on the Switch board, potential inputs (pins 12 and 13) of OR gate IC2 (d) becomes L and H, and output (pin 11) of OR gate IC2 (d) becomes H. The H level is sent to D input (pin 5) of D flip-flop IC1 through inverts IC5 (c) and (d). The 1/2 VD pulse is supplied to CLK input (pin 1) of IC1 and the H level is supplied to CLR input (pin 9) of IC1. Therefore, the H level obtained at Q output (pin 7) of D flip-flop IC1 is fed to the Sync board.
On the other hand, since potential input (pins 2, 1, 5, 6, 8 and 9) of OR gate IC2 (a), (b) and (c) remains L, Q output (pins 15, 10 and 2) of D flip-flop IC1 stays L level.
As a result, the camera 1 video signal is supplied to the video output connector.
At the same time, the H level at pin 7 of IC1 is fed to D1 on the Switch board through power switching Q4 to light.

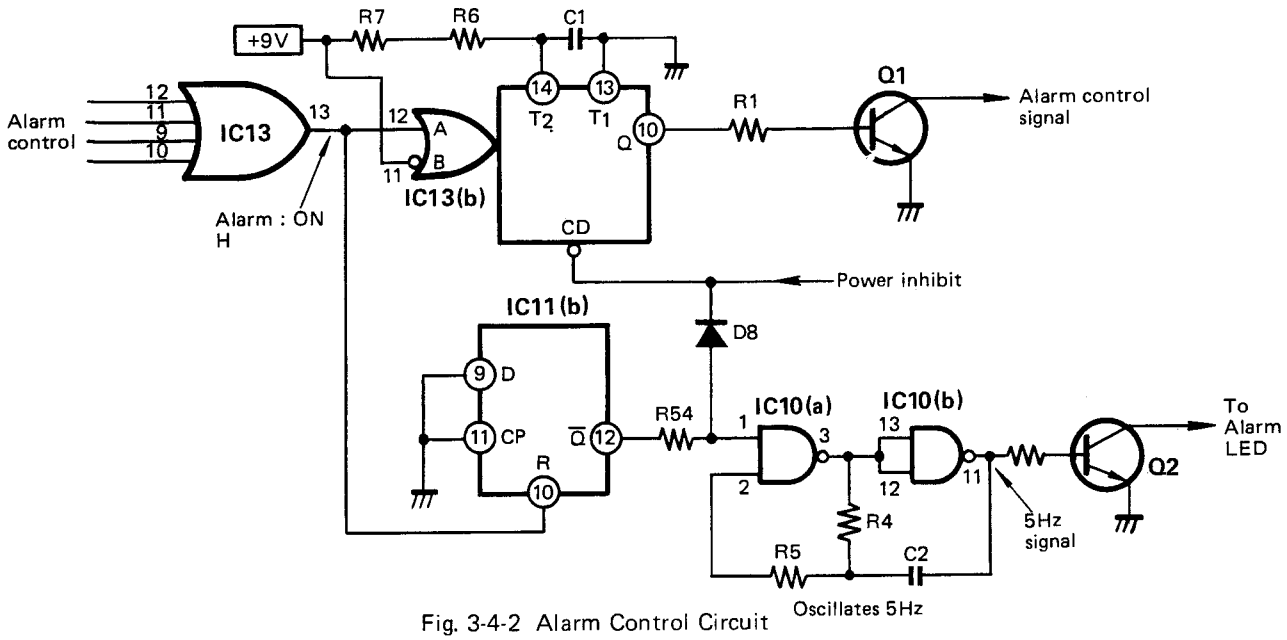


Fig. 3-4-2 Alarm Control Circuit

3-4-2 Alarm Control Circuit

When the Camera 1 of Spot Monitor Control Input terminal on the rear of Quad Unit WJ-400 is grounded, high (H) level obtained at output (pin 13) of OR gate IC3 is fed to pin 10 of D flip-flop IC11 (b) and trigger input (pin 12) of monostable multivibrator IC13 (b). The pulse obtained at pin 10 of IC13 (b) is fed to the Alarm Control Output (ALARM OUT) through inverter Q1 to drive externally connected buzzer/alarm.
The H level is obtained at $\overline{Q}$ output (pin 12) of D flip-flop IC11 (b) is fed to input pin 1 of NAND gate IC10 (a). IC10 (a) and IC10 (d) make an astable multivibrator which oscillates 5Hz frequency. The 5Hz oscillation pulse obtained at pin 11 of IC10 (d) is fed to Alarm LED D6 on the Alarm LED board through inverter Q2. The Alarm LED D6 starts to blink when a Spot Monitor Control terminal is grounded.
When the Alarm Reset Switch on the front of Quad Unit is set to reset position by pressing the SW5 on the Switch board, the L level is supplied from the quad/camera picture control circuit to SET (S) input (pin 8) of IC11 (b) and reset to the alarm control and stops oscillation.

3-4-3 Automatic Reset Circuit

◆ Automatic Reset Circuit

When the Spot Monitor Control Input terminal on the rear of Quad Unit WJ-400 is grounded, high (H) level obtained at output pin 13 of OR gate IC3 is fed to trigger input (pin 4) of monostable multivibrator IC13 (a).
The pulse whose width is 60 seconds is generated from IC13 (a) and fed to the base of Q11 through the Auto Reset Switch SW7.
The positive pulse obtained at the collector of Q11 is fed to the quad/camera picture control circuit.
The reset time is factory-set to 60 seconds and it is adjusted to 1 ~ 60 seconds by VR1 (TIME ADJ).
SW7 (AUTO RESET SWITCH) is factory-set to the OFF position.

◆ Reset Inhibit Circuit

When the two-wire intercom system is used with the Quad system, the wires connected between a master unit and a branch unit of intercom system are also connected to the Spot Monitor Control Input terminal 1-4 and the ground terminal respectively. In this system if the call button on the branch unit is pressed, the potential at the base of Q15 becomes low (L) turning Q15 OFF. As a result, high (H) potential is fed to OR gate IC2 (d), inverters IC5 (c) and (d), and Q output of D flip-flop IC1 is set to H level and video signal of camera No. 1 can be sent to the video output connector. At the same time, H potential is sent to monostable multivibrator IC13 (a) which determines the automatic reset time. However, the spot monitoring mode set by pressing the call button on the branch unit of intercom system should not be reset to the quad mode during conversation. During the conversation, the call button is released and approximately +6V DC is fed through 3.9V zener diode D4, D5, D6 and D7 turning Q8, Q9 and Q10 ON. Therefore, the anode of D2 is kept to approximately 0.7V and the pulse generated by IC13 (a) does not pass through D2. As a result, the quad mode is not reset automatically during conversation using intercom system.

If the phone is put down after finishing the conversation, the potential fed to D4, D5, D6 and D7 becomes approximately +0.7V DC and Q8, Q9 and Q10 are turned OFF. As a result, low potential at the collector of Q10 is fed to the base of Q11 turning it ON and reset trigger is generated at the collector of Q11. This trigger is fed to the quad/camera picture control circuit and the system is changed from spot monitor mode to quad mode.
When the RECOVER terminal is grounded externally, the quad/camera picture control circuit is manually reset to the quad mode.

3-4-4 Blanking Pulse Generator Circuit

The VD pulse is supplied from the pulse generator IC1 on the Sync board to pin 3 of D flip-flop IC9 (a) and 1/2 frequency-divided VD pulse obtained at Q output (pin 1) of IC9 (a) is fed to pin 11 of other D flip-flop IC9 (b).
When the Alarm Reset Switch on the front of Quad Unit is set to quad mode, potential high (H) level is supplied from the quad/camera picture control circuit to input terminals (pins 4 and 11) of monostable multivibrator IC12 (a) and (b). The H level obtained at pin 6 of IC12 (a) is fed to pin 12 of IC12 (b).
The H level at Q output (pin 10) is sent to DATA (D) input (pin 9) of D flip-flop IC9 (b) and negative clock pulse obtained at $\overline{Q}$ output is fed to pin 6 of NAN gate IC10 (a). The low level at $\overline{Q}$ output (pin 9) is sent to pin 5 of NAND gate IC10 (a).
The generated blanking pulse is obtained at pin 4 of NAND gate IC10 (a) is fed to the Sync board.

3-4-5 Quad/Camera Picture Control Circuit

When the Power Switch on the front of Quad Unit WJ-400 is turned ON, potential low (L) level is fed to pin 3 of inverter IC6 (b) and high (H) level obtained at pin 4 of IC6 (b) is fed to pin 6 of NAND gate IC8 (b). The L level is supplied from the Power board to pin 5 of NAND gate IC8 (b) and the H level obtained at pin 4 of IC8 (b) is fed to pins 1 and 2 of NAND gate IC8 (a). The L level obtained at pin 3 of IC8 (a) is fed to pin 13 of other NAND gate IC8 (d). The potential L level is supplied from the automatic reset circuit to pin 13 of inverter IC6 (e) and H level is obtained at pin 12 of IC6 (e) is fed to NAND gate IC8 (d).
The H level obtained at pin 11 of IC8 (d) is sent to pin 13 of AND gate IC7 (d). The L level is supplied from the spot monitor control circuit to pin 11 of inverter IC6 (d) and pin 12 of AND gate IC4 (d) respectively. The H level obtained at pin 10 of IC6 (d) is fed to pin 12 of AND gate IC7 (d) and output (pin 11) of IC7 (d) becomes H level. The H level is fed to pin 8 of NAND gate IC10 (c). The 1/2 VD pulse is supplied from the blanking generator circuit to pin 9 of IC10 (c) and pin 13 of IC11 (d). The 1/2 VD pulse obtained at pin 10 of IC10 (c) is fed to SET (S) input (pin 6) of flip-flop IC11 (a) through inverter IC6 (a). The L level obtained at pin 11 of IC4 (d) is fed to RESET (R) input of flip-flop IC11 (a). As a result, the H level obtained at output Q of IC4 (d) is fed to the Sync board and the L level obtained at output $\overline{Q}$ of IC4 (d) is fed to the Sync board and H and L level are controlled the quad picture of camera.
Also the 1/2 VD pulse is fed to CLEAR (CLR) input (pin 1) of D flip-flop IC1 and the L level is fed to CLOCK (CLK) input (pin 9) of IC1 and reset to D flip-flop IC1. The L level obtained at Q outputs (pins 15, 10, 2 and 7) of IC1 are fed to the Sync board.
When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to the quad mode, the potential L level is supplied from the Spot monitor control circuit to pin 12 of AND gate IC4 (d) and the 1/2 VD pulse is supplied from the blanking generator circuit to pin 13 of IC4 (d).
The L level obtained at pin 11 of IC4 (d) is fed to RESET (R) input (pin 4) of IC11 (a).
The H level is supplied to pin 12 of AND gate IC7 (d) through inverter IC6 (d). The H level is supplied from pin 11 of IC8 (d) to pin 13 of IC7 (d).
The H level obtained at pin 11 of IC7 (d) is fed to pin 8 of NAND gate IC10 (c) and the 1/2 VD pulse is supplied from the blanking generator circuit to pin 9 of IC10 (c) and the 1/2 VD pulse is fed to SET (S) input (pin 6) of IC11 (a) through inverter IC6 (a). As a result, the H level obtained at $\overline{Q}$ output (pin 1) of IC11 (a) is fed to the Sync board and the L level obtained at Q output (pin 2) of IC11 (a) is fed to the Sync board and H and L level are controlled the quad picture of camera.

When the Camera Selection Switch on the front of Quad Unit WJ-400 is set to position 4, the potential H level is supplied from the spot monitor control circuit to pin 12 of AND gate IC4 (d) and the 1/2 VD pulse supplied from the blanking generator circuit to pin 13 of IC4 (d). The 1/2 VD pulse obtained at pin 11 of IC4 (d) is fed to RESET (R) input of flip-flop IC11 (a). The L level is supplied from the spot monitor control circuit to pin 12 of AND gate IC7 (d) through inverter IC6 (d) and the L level is supplied from NAND gate IC8 (d) to pin 13 of IC7 (d). The output of IC7 (d) becomes L level.
The L level is sent to pin 8 of NAND gate IC10 (c).
The 1/2 VD pulse supplied from the blanking generator circuit to pin 9 of IC10 (c) and H level obtained at pin 10 of IC10 (c) is fed to pin 1 of inverter IC6 (a). The L level is fed to SET (S) input of flip-flop IC11 (a).
As a result, the L level is obtained at Q output of flip-flop IC11 (a) is fed to the Sync board and the H level is obtained at $\overline{Q}$ output of IC11 (a) is fed to the Sync board. The H and L level are controlled spot picture of camera.

Also the H level is fed to CLEAR (CLR) input (pin 1) of IC1 and the 1/2 VD pulse is fed to CLOCK (CLK) input (pin 9) of IC1.

3-5 Sync Board

3-5-1 Clock Pulse Generator Circuit

The HD pulse is supplied from pin 17 of sync generator IC1 to pin 1 of phase frequency detector IC2 where it is compared in phase with the pulse comes from 1/128 counter. The phase difference is converted into the DC voltage and obtained at pin 8 of IC2. It is fed to voltage controlled oscillator (VCO) IC3. The oscillated signal obtained at pin 6 of IC3 is fed to pin 13 of 1/128 counter IC41. The pulse obtained at pin 5 of IC41 is fed to pin 3 of phase frequency detector IC2. In this way, the phase lock loop (PLL) circuit is made and about 2MHz clock pulse which is synchronized with the HD pulse is generated from the VCO. The generated clock pulse is fed to the HD generator circuit through amplifiers Q4 nd Q5.

IC No	IC6 (b)		IC8 (b)			IC8 (a)			IC6 (e)		IC8 (d)		
Pin No	3	4	5	6	4	1	2	3	13	12	12	13	11
Power ON	L	H	L	H	H	H	H	L	L	H	H	L	H
Alarm Reset ON	H	L	H	L	H	H	H	L	L	H	H	L	H
Camera Select ON	L	H	H	L	H	H	H	L	L	H	H	L	H

IC No	IC7 (d)			IC4 (d)			IC10 (c)			IC6 (a)		IC11 (a)			
Pin No	13	12	11	13	12	11	9	8	10	1	2	1	2	4	6
Power ON	H	H	H	⎍	L	L	⎍	H	⎴	L	H	H	L	L	⎍
Alarm Reset ON	H	H	H	⎍	L	L	⎍	H	⎴	L	H	H	L	L	⎍
Camera Select ON	H	L	L	⎍	H	⎍	⎍	L	H	H	L	L	H	⎍	L

Table 3-4-5

3-5-2 Sync Generator Circuit

The crystal oscillator which consists of crystal oscillator X1, C9, C10, R5 and R4 connected between pin 4 and pin 3 of IC1 oscillates 31.5kHz for USA standard (CCIR standard : 31.25kHz).
The VCO oscillator which consists of L1, C3, C4, C5, D11 and CT1 (H.FREQ ADJ) connected between pin 19 and pin 18 of IC1 oscillates 4. 095MHz for USA standard (CCIR standard : 4.0625MHz).
This frequency is divided to generates the horizontal (H) frequency in IC1 and H frequency pulse is compared in phase with the HD pulse generated by the crystal oscillator. The DC voltage corresponding to the phase difference is obtained at pin 20 of IC1 and sent to the VCO to form the phase lock loop (PLL) and to control the oscillated frequency.
The horizontal drive (HD) pulse obtained at pin 17 of IC1 is fed to the other circuit.
The sync pulse obtained at pin 15 of IC1 is fed to the Process board through pin 5 of CN6A.
The blanking (BL) pulse obtained at pin 13 of IC1 is fed to the position control pulse generator circuit through amplifier Q2.
The vertical drive (VD) pulse obtained at pin 10 of IC1 is fed to the other circuit through amplifier Q1.

3-5-3 HD Generator Circuit

The horizontal drive (HD) pulse (A) is supplied from the sync generator circuit to DATA (D) input (pin 7) of shift resistor IC4.
The clock pulse (B) is supplied from the clock pulse generator circuit to pins 4 and 12 of shift register IC4, and pin 9 of 4-bit shift register IC7 (a) through inverter IC18 (a).
The pulse (C) obtained at Q32 output (pin 6) of IC4 is fed to the character generator circuit and pin 4 of 4-bit shift register IC6 (a). The Q output (pin 11) pulse (D) is fed to pin 8 of OR gate IC8 (b) and pin 5 of switcher IC9.
The pulse (E) obtained at Q48 output (pin 2) of IC4 is fed to pin 13 of OR gate IC8 (c).
The pulse obtained at Q64 output (pin 5) of IC4 is fed to D input (pin 9) of IC4 and pin 1 of 4-bit shift register IC6 (c). The Q output (pin 13) pulse (F) is fed to pin 1 of OR gate IC8 (a) and pin 5 of 4-bit shift register IC6 (d) and the output pulse is fed to the position control pulse generator circuit through other 4-bit shift register IC7 (G).

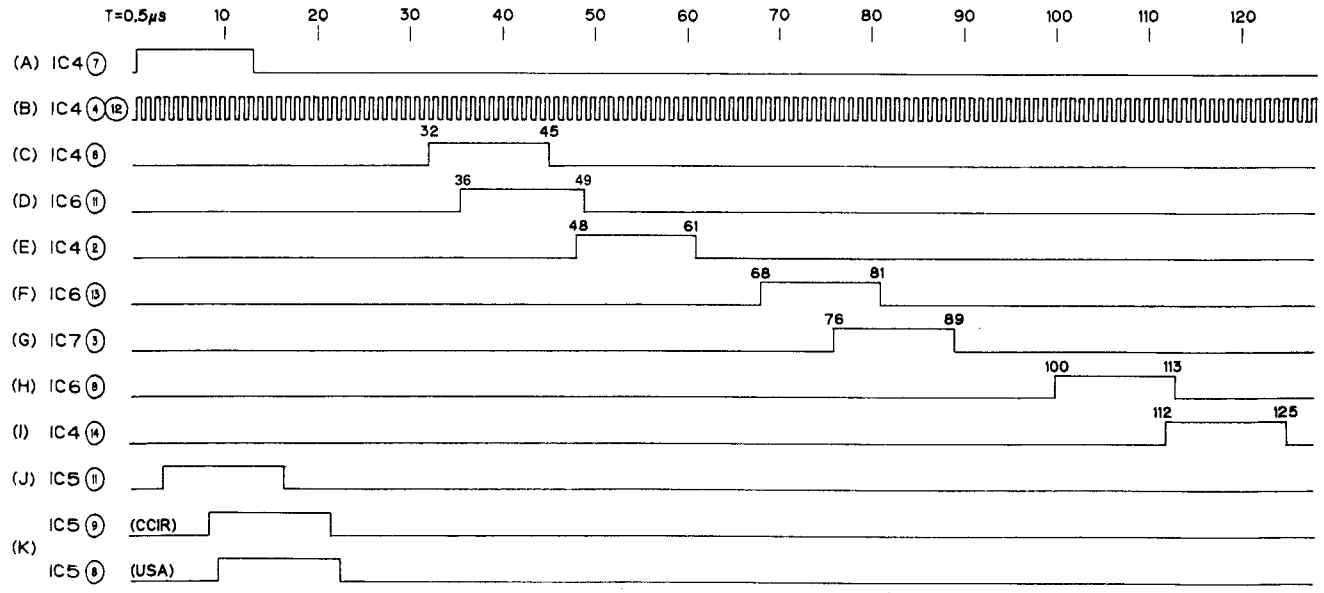
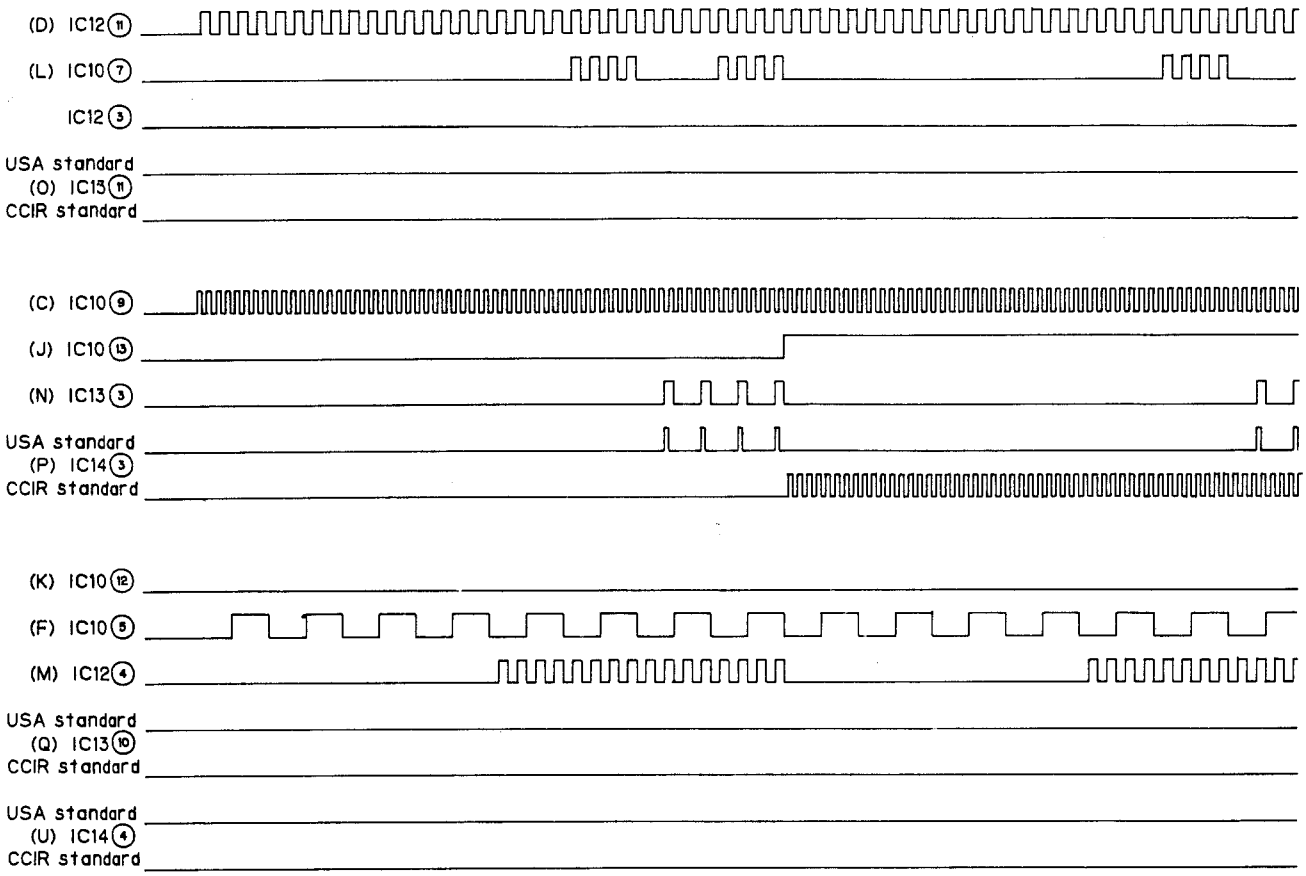
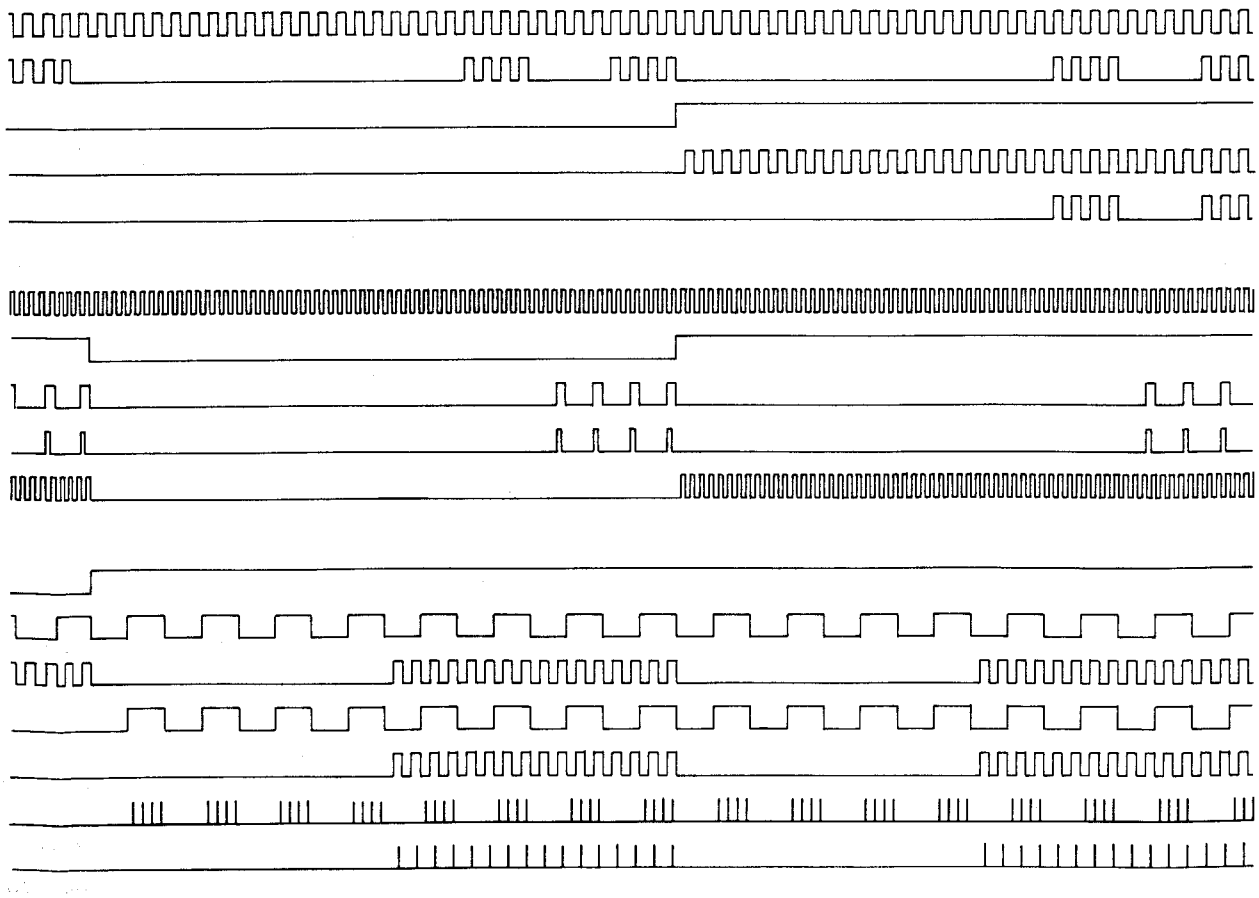


Fig. 3-5-3


(D) IC12 ⑪
(L) IC10 ⑦
IC12 ③
USA standard
(O) IC13 ⑪
CCIR standard
(C) IC10 ⑨
(J) IC10 ⑬
(N) IC13 ③
USA standard
(P) IC14 ③
CCIR standard
(K) IC10 ⑫
(F) IC10 ⑤
(M) IC12 ④
USA standard
(Q) IC13 ⑩
CCIR standard
USA standard
(U) IC14 ④
CCIR standard



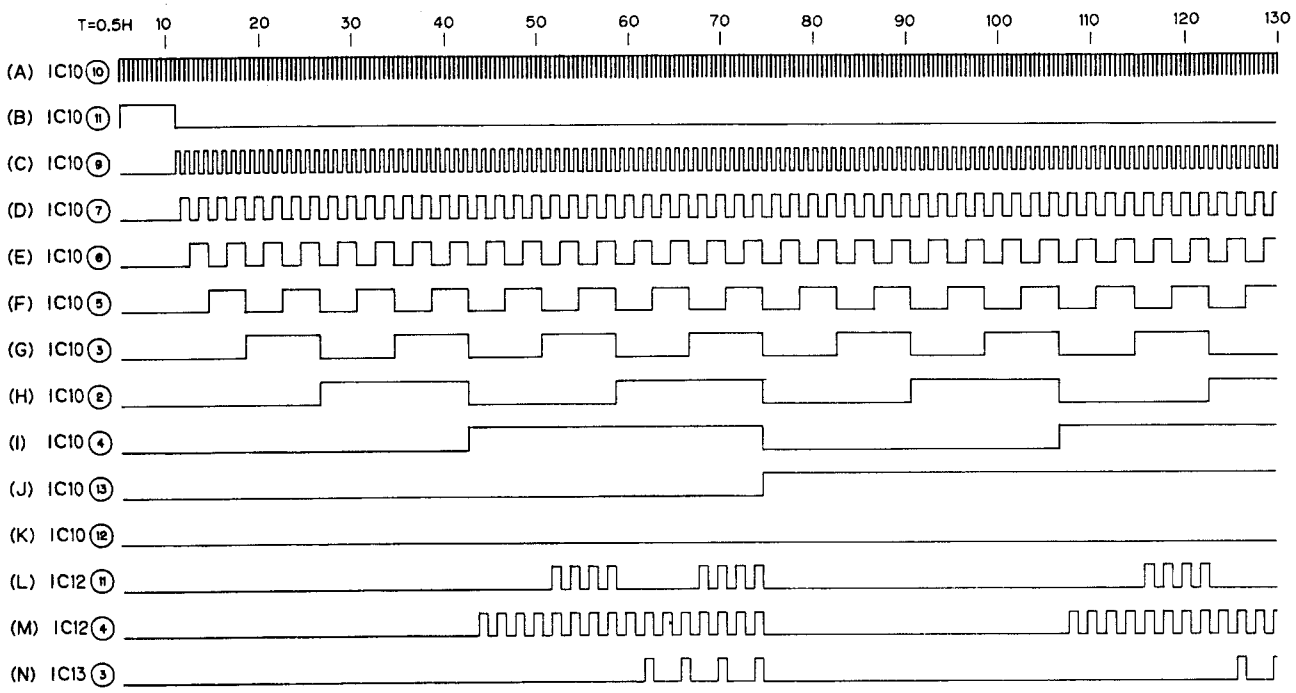
The pulse obtained at Q32 output (pin 10) of IC4 is fed to pin 9 of OR gate IC8 (b) through 4-bit shift register IC6 (b) (H).
The pulse (I) obtained at Q48 output (pin 14) of IC4 is fed to pin 12 of OR gate IC8 (c) and pin 7 of switcher IC9.
The HD pulse (A) is also supplied to D input (pin 4) of shift register IC5 (a). The $\overline{Q}$ output pulse (J) obtained at pin 11 of IC5 (a) is fed to pin 2 of OR gate IC8 (a). The Q output pulse obtained at pin 12 of IC5 (a) is fed to D input (pin 6) of other shift register IC5 (b).
For USA standard, the $\overline{Q}$ output pulse (K) obtained at pin 8 of IC5 (b) is fed to pins 6 and 4 of switcher IC9.
For CCIR standard, Q output pulse (H) obtained at pin 9 of IC5 (b) is fed to pins 6 and 4 of switcher IC9.
When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to quad mode, potential at control terminal pins 9 and 14 becomes L and H and the terminal pins 7 and 5 are connected to terminal pins 10 and 11. The pulse (I) and (D) are obtained at pins 10 and 11 of IC9 are fed to the Process board.
When the Camera Selection Switch on the front of Quad Unit WJ-400 is selected to camera position, potential at control terminal pins 9 and 14 becomes H and L and the terminal pins 6 and 4 are connected to terminal pins 10 and 11. The pulse (H) obtained at pins 10 and 11 is fed to the Process board.
The output pulse of OR gate IC8 (a), (b) and (c) are sent to the VD generator circuit.

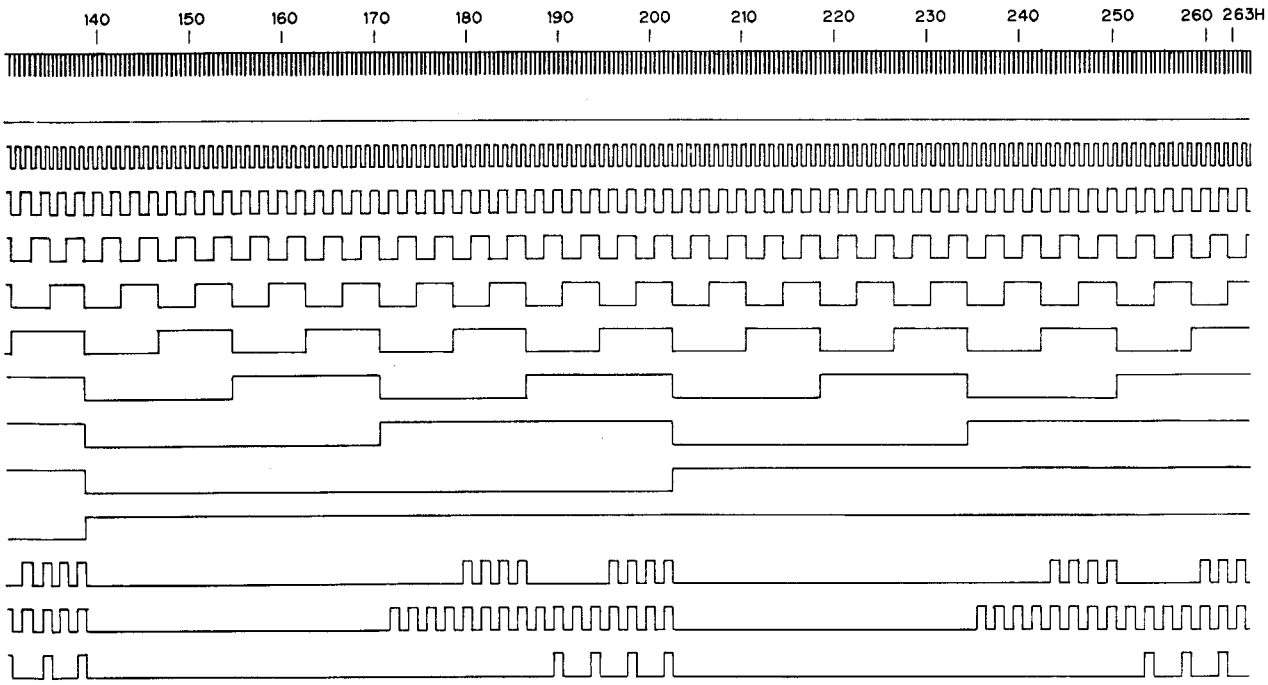
3-5-4 Vertical Counter Circuit

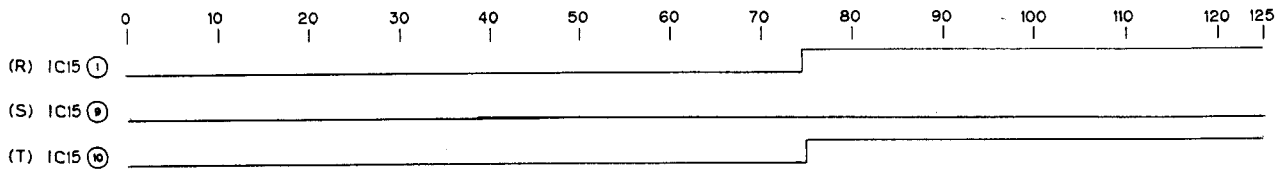
The clock pulse (A) is supplied from the HD generator circuit to CLOCK (C) input (pin 10) of counter IC10 through inverter IC37 (a).
The VD pulse (B) is supplied from the sync generator circuit to RESET (R) input (pin 11) of IC10.
The pulse (D) obtained at Q2 output (pin 7) of IC10 is fed to pin 4 of switcher IC11 and pin 9 of AND gate IC12 (c), and pin 6 of IC12 (b).
The pulse (E) obtained at Q3 output (pin 6) of IC10 is fed to pin 8 of AND gate IC12 (c) and output pulse is sent to pin 1 of other AND gate IC13 (a).
The pulse (F) is obtained at Q4 output (pin 5) of IC10 is fed to pin 6 of switcher IC11.
The pulse (G) is obtained at Q5 output (pin 3) of IC10 is fed to pin 13 of AND gate IC12 (d).
The pulse (H) is obtained at Q6 output (pin 2) of IC10 is fed to pin 15 of switcher IC11 and pin 6 of AND gate IC13 (b), and the pulse (I) obtained at Q7 output (pin 4) of IC10 is fed to pin 5 of IC13 (b).
The output pulse of IC13 (b) is fed to pin 2 of other AND gate IC13 (a) and output pulse (N) is sent to pin 2 of IC11. The pulse (I) is also sent to pin 5 of IC12 (b) and output pulse (M) is fed to pin 7 of switch IC11 and pin 12 of AND gate IC12 (d). The output pulse (L) at pin 11 of IC12 (d) is sent to pin 5 of IC11.
The pulse(J) is obtained at pin 13 of IC10 is fed to pins 1 and 3 of IC11.

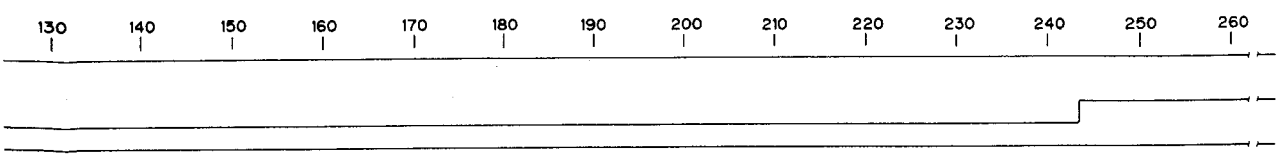
For USA standard
The potential control terminal pins 9 and 14 of IC11 becomes high (H) and low (L). The terminal pins 6, 4, 2 and 15 are connected to terminal pins 10, 11, 12 and 13. The pulse (D), (F), (N) and (H) obtained at pins 10, 11, 12 and 13 of IC11 are fed to pin 8 of IC13 (c), pin 12 of IC13 (d), pin 2 of IC14 (a) and SET (S) input (pin 14) of IC15.
The pulse (J) and (K) are fed to pins 1 and 2 of AND gate IC12 (a) and output pulse is sent to pin 13 of other AND gate IC13 (d). The output pulse (O) at pin 11 of IC13 (d) is fed to S input (pin 6) of IC15.
The pulse (C) is fed to pin 1 of AND gate IC14 (a) and output pulse (P) is sent to S input (pin 12) of IC15.
The VD pulse (B) is supplied from the sync generator circuit to RESET (R) input (pins 7, 11 and 15) of IC15.
The Q1 (S) output pulse and Q2 (T) output pulse are sent to the VD generator circuit.
The Q3 (R) output pulse is sent to the character generator circuit.
The pulse (K) and (F) are supplied from IC10 to AND gate IC13 (c) and output pulse (Q) is sent to pin 6 of other AND gate IC14 (b), and mixed with the HD pulse. The output pulse (U) at pin 4 of IC14 (c) is fed to the position control pulse generator circuit.

For CCIR standard
The potential control terminal pins 9 and 14 of IC11 becomes L and H. The terminal pins 7, 5, 3 and 1 are connected to terminal pins 10, 11, 12 and 13.
The pulse (M), (L), (J) and (J) obtained at pins 10, 11, 12 and 13 of IC11.
The pulse (J) and (K) is supplied from IC10 to pins 1 and 2 of AND gate IC12 (a) and output pulse is sent to pin 13 of other AND gate IC13 (d).


T=0.5H
10
20
30
40
50
60
70
80
90
100
110
120
130
(A) IC10 ⑩
(B) IC10 ⑪
(C) IC10 ⑨
(D) IC10 ⑦
(E) IC10 ⑥
(F) IC10 ⑤
(G) IC10 ③
(H) IC10 ②
(I) IC10 ④
(J) IC10 ⑬
(K) IC10 ⑫
(L) IC12 ⑪
(M) IC12 ④
(N) IC13 ③


140
150
160
170
180
190
200
210
220
230
240
250
260
263H

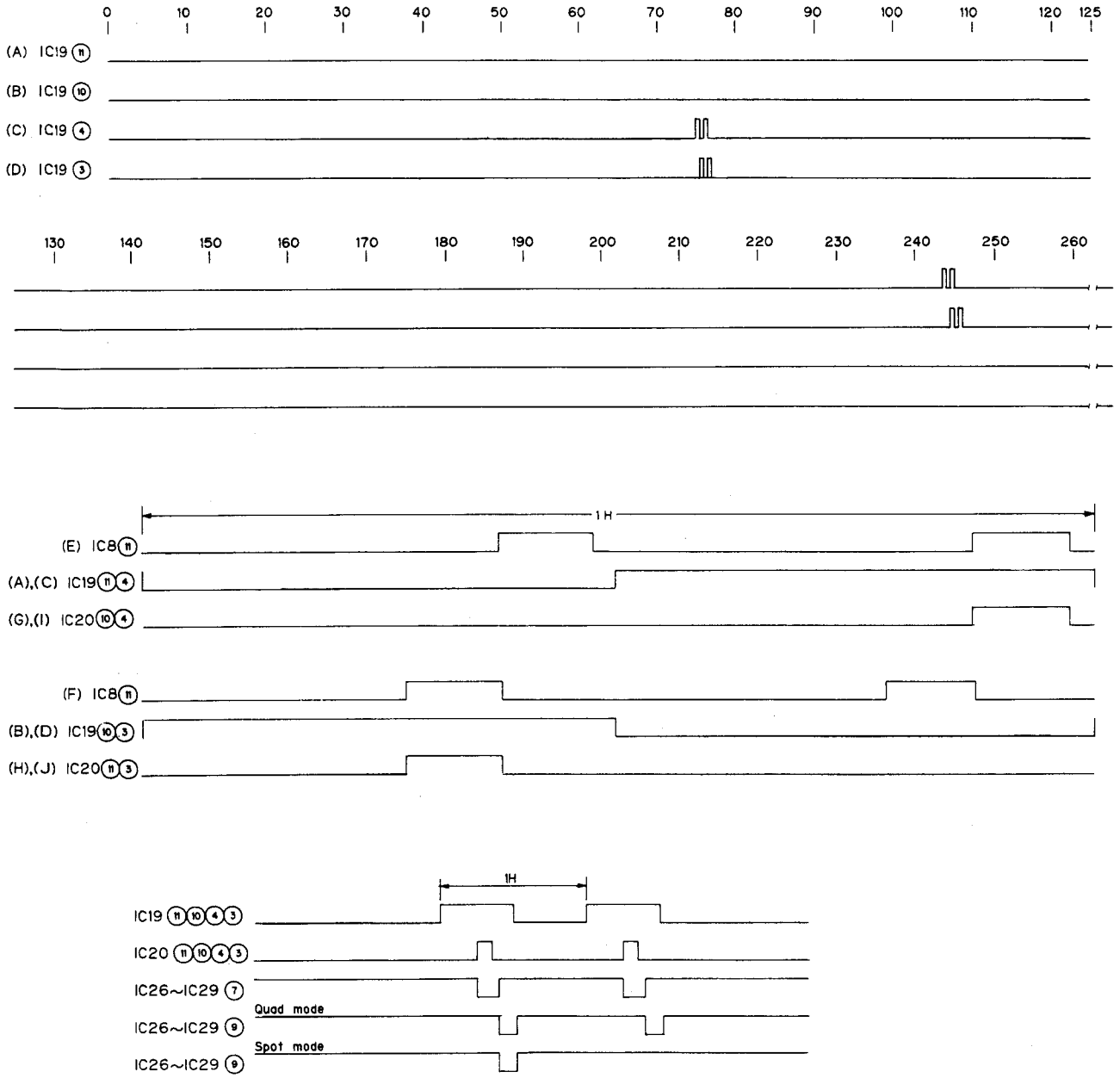

0
10
20
30
40
50
60
70
80
90
100
110
120
125
(R) IC15 ①
(S) IC15 ⑨
(T) IC15 ⑩


130
140
150
160
170
180
190
200
210
220
230
240
250
260

The pulse (L) is supplied from pin 11 of IC11 to pin 12 of AND gate IC13 (d) and output pulse (O) is fed to S1 input (pin 6) of R/S latch IC15.
The pulse (C) is supplied from IC10 to pin 1 of AND gate IC14 (a) and the pulse (J) is supplied from pin 12 of IC11 to pin 2 of AND gate IC14 (a). The output pulse (P) is fed to S2 input (pin 12) of IC15.
The pulse (J) is also supplied from pin 13 of IC11 to S3 input (pin 14) of IC15.
The VD pulse (B) is supplied from the sync generator circuit to R1, R2 and R3 input (pins 7, 11 and 15) of IC15.
The pulse (S) and (T) obtained at Q1 and Q2 output (pins 9 and 10) of IC15 are fed to the VD generator circuit.
The pulse (R) obtained at Q3 output (pin 1) of IC15 is fed to the position control pulse generator circuit.
The pulse (M) and (K) are supplied from pin 10 of IC11 and pin 12 of IC10 to pins 8 and 9 of AND gate IC13 (c) and output pulse (Q) is sent to pin 6 of other AND gate IC14 (b).
The HD pulse is supplied from the sync generator circuit to pin 5 of AND gate IC14 (b) and output pulse (U) is fed to the position control pulse generator circuit.

3-5-5 VD Generator Circuit

The pulse (S) is supplied from the vertical counter circuit to the V timing control circuit consisting of AND gate IC14(c), NAND gate IC40 (a), 4-bit binary counter IC16 (b), inverter IC37 (c), NAND gate IC40 (d), binary decoder IC17 (b), and INVERT-OR gates IC19 (d) and (c), which generates the position 1 and 2 of vertical drive control pulse (A) and (B).
The pulse (T) is supplied from the vertical counter circuit to the V timing control circuit consisting of AND gate IC14 (d), NAND gate IC40 (b), 4-bit binary counter IC16 (a), inverter IC37 (b), NAND gate IC40 (c), binary decoder IC17 (a), and INVERT-OR gates IC19 (b) and (a), which generates the position 3 and 2 of vertical drive control pulse (C) and (D).
The pulse (A) and (B) are fed to pins 8 and 12 of AND gate IC20 (c) and (d) and pulse (E) and (F) are supplied from the HD pulse generator circuit to pin 9 of IC20 (c) and pin 13 of IC20 (d).
The pulse (G) and (H) obtained at pin 10 of IC20 (c) and pin 11 of IC20 (d) are fed to pins 7 and 5 of switcher IC21.
The pulse (C) and (D) are fed to pins 6 and 2 of AND gate IC20 (b) and (a) and pulse (E) and (F) are supplied from the HD pulse generator circuit to pins 5 and 1 of IC20 (b) and (a).
The pulse (I) and (J) obtained at pin 4 of IC20 (b) and pin 3 of IC20 (a) are fed to pins 3 and 1 of switcher IC21.
The VD pulse (K) is supplied from the sync generator circuit to pins 6, 4, 2 and 15 of switcher IC21.
When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to quad mode, potential at control terminal pins 9 and 14 become low (L) and high (H) and the terminal pins 7, 5, 3 and 1 are connected to terminal pins 10, 11, 12 and 13. The pulse (G) obtained at pin 10 of IC21 is fed to the Process board through monostable multivibrator IC29 (a) and (b).
The pulse (H) obtained at pin 11 of IC21 is fed to the Process board through monostable multivibrator IC28 (a) and (b).
The pulse (I) obtained at pin 12 of IC21 is fed to the Process board through monostable multivibrator IC27 (a) and (b).
The pulse (J) obtained at pin 13 of IC21 is fed to the Process board through monostable multivibrator IC26 (a) and (b).
When the Camera Selection Switch on the front of Quad Unit WJ-400 is set the camera, potential at control terminal pins 9 and 14 of IC21 become H and L and the terminal pins 6, 4, 2 and 15 are connected to terminal pins 10, 11, 12 and 13. The VD pulse (K) obtained at pins 10, 11, 12 and 13 of IC21 are fed to the Process board through monostable multivibrator IC29, IC28, IC27 and IC26 respectively.


0 10 20 30 40 50 60 70 80 90 100 110 120 125
(A) IC19 (11)
(B) IC19 (10)
(C) IC19 (4)
(D) IC19 (3)
130 140 150 160 170 180 190 200 210 220 230 240 250 260
1 H
(E) IC8 (11)
(A),(C) IC19 (11) (4)
(G),(I) IC20 (10) (4)
(F) IC8 (11)
(B),(D) IC19 (10) (3)
(H),(J) IC20 (11) (3)

1H
IC19 (11) (10) (4) (3)
IC20 (11) (10) (4) (3)
IC26~IC29 (7)
Quad mode
IC26~IC29 (9)
Spot mode
IC26~IC29 (9)

3-5-6 Position Control Pulse Generator

When the Camera Selection Switch on the front of Quad Unit WJ-400 is set the camera 1, potential low (L) level is fed to pins 8, 9, 13 and 12 of OR gate IC25 (a) and (b) respectively. The L level obtained at pins 10 and 11 of IC25 (a) and (b) are fed to SET (S) input (pins 6 and 8) of D flip-flop IC22 respectively. The L level is supplied from the quad/camera select circuit on the Alarm board to DATA (D) input (pins 5 and 9) of IC22 respectively. The HD and VD pulse are supplied from the sync generator circuit to RESET (R) input (pins 4 and 10) of IC22 respectively.

The clock pulse is sent from the HD generator circuit and the VD generator circuit to CLOCK (C) input (pins 3 and 11) of IC22.

The high (H) level obtained at $\overline{Q}$ output (pins 2 and 12) of IC22 are fed to pins 2, 4, 1 and 13 of IC23 (a), (b) and (c).

The L level obtained at Q output (pins 1 and 13) of IC22 are fed to pins 12 and 3 of IC23 (c) and (b), and pins 2 and 1 of IC24 (d).

As a result, the output pins 9, 10, 6 and 9 of IC23 (a), (c), (b) and IC24 (d) become L, H, H and H. The L, H, H and H level are sent to switcher IC502 and IC503 through inverter IC501 on the Process board and terminal pin 9 is connected terminal pin 8 and camera 1 signal is sent to the video output circuit.

For the camera-2, camera -3 and camera-4 selection refer to table 3-5-6.

When the Alarm Reset Switch on the front of Quad Unit WJ-400 is set to quad mode, L level is fed to pins 8, 9, 13 and 12 of OR gate IC25 (a) and (b) respectively. The L level obtained at pins 10 and 11 of IC25 (a) and (b) are fed to (S) input (pins 6 and 8) of D flip-flop IC22 respectively. The H level is supplied to the (D) input (pins 5 and 9) of IC22 respectively.

The HD and VD pulse are supplied from the sync generator circuit to (R) input (pins 4 and 10) of IC22 respectively. The clock pulse is sent from the HD generator circuit and the VD generator circuit to (C) input (pins 3 and 11) of IC22.

The pulse (A) obtained at $\overline{Q}$ output (pin 2) of IC22 (a) is fed to pin 2 of NAND gate IC23 (a) and pin 4 of other NAND gate IC23 (b).

The pulse (B) obtained at Q output (pin 1) of IC22 (a) is fed to pin 12 of NAND gate IC23 (c) and pin 2 of other NAND gate IC24 (d).

The pulse (C) obtained at $\overline{Q}$ output (pin 12) of IC22 (b) is fed to pin 1 of IC23 (a) and pin 13 of IC23 (c).

The pulse (D) obtained at Q output (pin 13) of IC22 (b) is fed to pin 3 of IC23 (b) and pin 1 of IC24 (d).

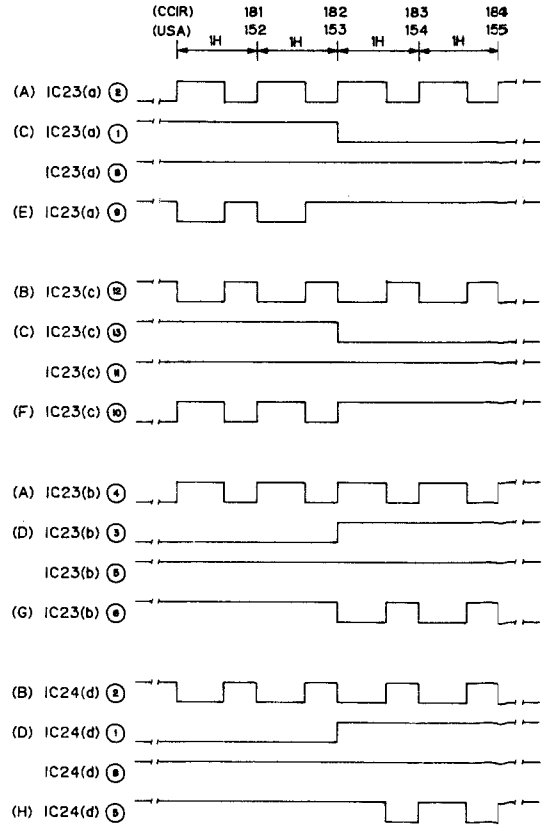
The H level is supplied from NAND gate IC24 (b) through inverter IC36 (a) to pin 8 of IC23 (a), pin 11 of IC23 (c), pin 5 of IC23 (b) and pin 8 of IC24 (d).

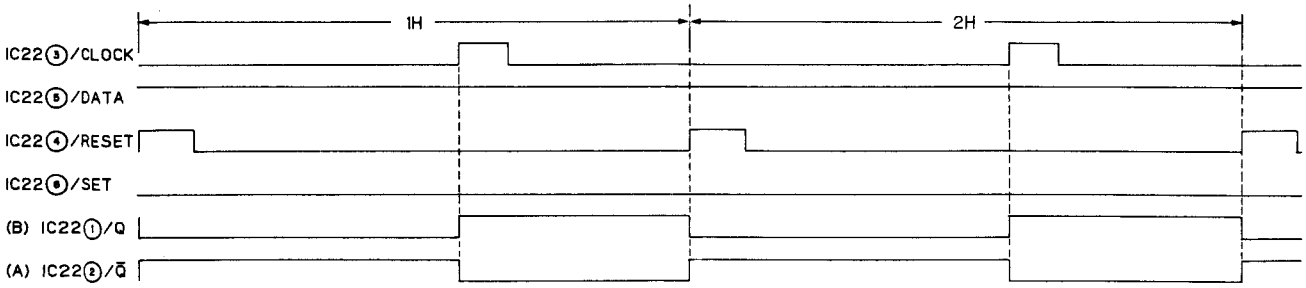
As a result,the pulse (E) obtained at pin 9 of IC23(a) is fed to switcher IC502 and IC503 through inverter IC501 on the Process board and each terminal pin 9 are connected to terminal pin 8 and camera-1 signal is supplied to the video output circuit during L level of the pulse (E).

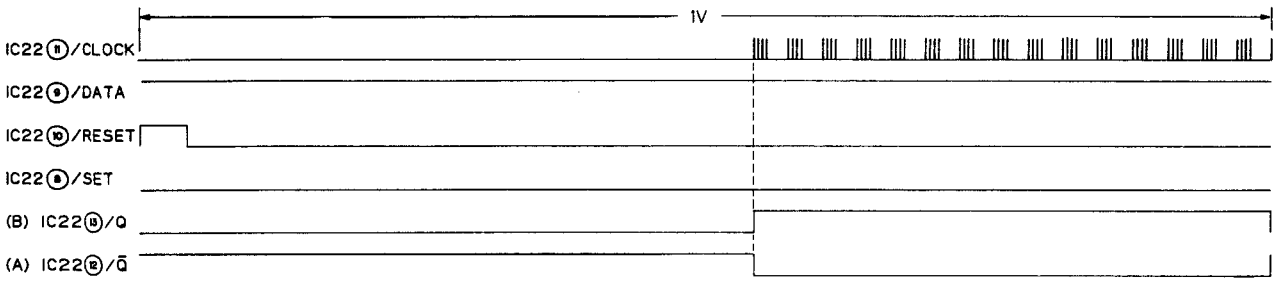
The pulse (F) obtained at pin 10 of IC23 (c) is fed to IC502 and IC503 through IC501 on the Process board and each terminal pin 3 are connected to terminal pin 4 and camera-2 signal is supplied to the video output circuit during L level of pulse (F).

The pulse (G) obtained at pin 6 of IC23 (b) is fed to IC502 and IC503 through IC501 on the Process board and each terminal pin 11 are connected to terminal pin 10 and camera-3 signal is supplied to video output circuit during L level of pulse (G).

The pulse (H) obtained at pin 9 of IC24(d) is fed to IC502 and IC503 through IC501 on the Process board and each terminal pin 1 are connected to terminal pin 2 and camera-4 signal is supplied to the video output circuit during L level of pulse (H).




1H
2H
IC22③/CLOCK
IC22⑤/DATA
IC22④/RESET
IC22⑥/SET
(B) IC22①/Q
(A) IC22②/Q̄


1V
IC22⑪/CLOCK
IC22⑨/DATA
IC22⑩/RESET
IC22⑧/SET
(B) IC22⑬/Q
(A) IC22⑫/Q̄

3-5-7 Character Generator Circuit.

When the Camera Selection Switch on the front of Quad Unit WJ-400 is selected to camera-1 position, the HD pulse is supplied to pin 3 of inverter IC42 (a).The inverted HD pulse is sent to pin 6 of character generator IC38 and CLOCK (C) input (pin 1) of counter IC30.
The pulse (A) obtained at Q1 output (pin 12) of IC30 is fed to the pulse control circuit consisting of IC35 (f),IC32 (a),IC32 (b),IC32 (c),IC32 (d) and IC34 (d).
The pulse (B), pulse (C) and pulse (D) obtained at Q2, Q3 and Q4 output (pins 11,9 and 6) of IC30 are supplied to A,B and C input (pins 10,13 and 12) of decoder IC31 respectively.
The pulse (J) and (E) obtained at Q6 and Q0 output (pins 7 and 3) of IC31 are sent to the pulse control circuit and control pulse (O) is fed to $\overline{CR}$ input (pin 13) of IC38. The pulse (P) is sent to CS input (pin 14) of IC38.
The pulse (F) obtained at Q1 output (pin 14) of IC31 is fed to pin 1 of AND gate IC33 (a) and the low (L) level is sent from the quad/camera control circuit on the Alarm board to pin 2 of IC33 (a) through inverter IC42 (e).The L level obtained at pin 3 of IC33 (a) is sent to anode of D3.
The pulse (G) obtained at Q3 output (pin 15) of IC31 is fed to pin 12 of AND gate IC33 (d) and L level is sent from the Key switch board to pin 13 of IC33 (d) through inverter IC42 (f) and other AND gate IC34 (a).
The L level obtained at pin 11 of IC33 (d) is fed to anode of D4.
The pulse (H) obtained at Q4 output (pin 1) of IC31 is fed to anode of D5. The pulse (K) is sent to A0 input (pin 12) of IC38 through inverter IC35 (a).
The pulse (F) obtained at Q1 output (pin 14) of IC31 is fed to anode of D6 and the pulse (G) obtained at Q3 output (pin 15) of IC31 is fed to pin 9 of AND gate IC33(c).The high (H) level is fed to pin 8 of IC33 (c) through inverter IC42 (c) / IC42 (b) and other AND gate IC34 (b).The pulse (H) obtained at pin 10 of IC33 (c) is fed to anode of D7 and mixed pulse (L) is sent to A1 input (pin 11) of IC38.
The pulse (G) obtained at Q3 output (pin 15) of IC31 is fed to pin 6 of AND gate IC33 (b) and H level is sent to pin 5 of IC33 (b) through inverter IC42 (d).The pulse (G) is obtained at pin 4 of IC33 (b) is fed to anode of D8.The pulse (H) and (I) are obtained at Q4 and Q5 output (pins 1 and 6) of IC31 are fed to anode of D9 and D10 respectively.
The mixed pulse (M) is fed to A2 input (pin 10) of IC38 through inverter IC35 (d) .
The pulse (G) obtained at Q3 output (pin 15) of IC31 is fed to A3 input (pin 9) of IC38 through inverter IC35 (c).
As a result,the character signal of 1 ch obtained at CO output (pin 7) of IC38 is fed to the video output circuit on Process board.
VR1 (CHARACTER PHASE) controls the character position on thr picture.
In case the Camera Selection Switch is set to the quad mode or Alarm Reset Switch on the front of Quad Unit WJ-400 is selected to camera-2, camera-3 or camera-4, refer to table 3-5-7.

	Spot Camera 1					Spot Camera 2					Spot Camera 3					Spot Camera 4					Quad mode				
IC38 12 A0	1	1	1	0	1	1	1	0	0	1	1	1	1	0	1	1	1	0	0	1	0	1	0	0	1
IC38 11 A1	0	1	0	1	1	0	1	1	1	1	0	1	1	1	1	0	1	0	1	1	0	1	0	1	1
IC38 10 A2	1	1	0	0	0	1	1	0	0	0	1	1	0	0	0	1	1	1	0	0	1	1	0	0	0
IC38 9 A3	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1

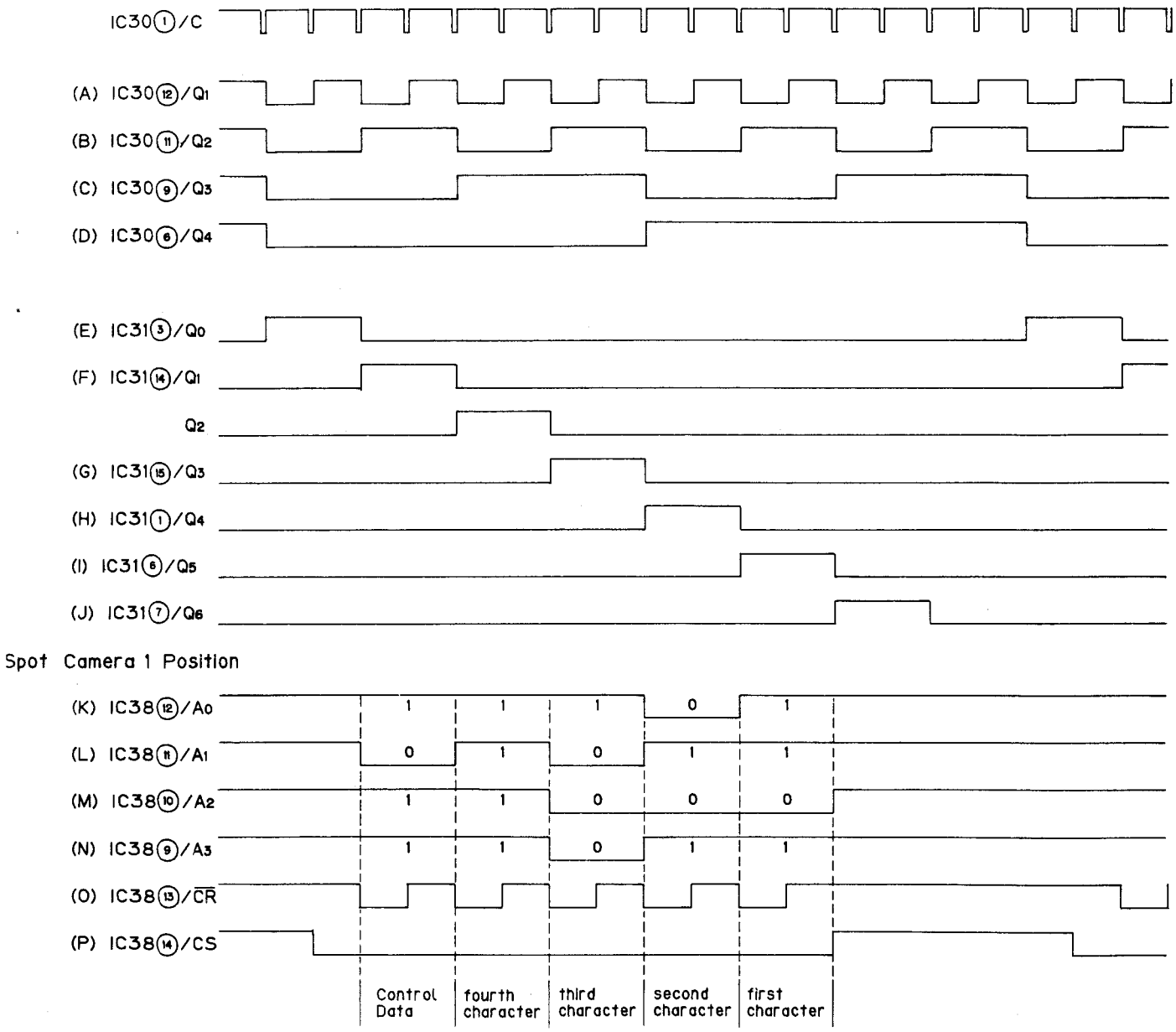
Control Data

A0 : 1 character ON 0 character OFF
A1 : 0 character position
A2 : 1 character size (small)
A3 : 1 channal indication

Charactor Data

Input data	Character	Input data	Character	Input data	Character	Input data	Character	Input data	Character
A0 : 1		A0 : 1		A0 : 0		A0 : 1		A0 : 0	
A1 : 1	Blank	A1 : 0	1	A1 : 1	2	A1 : 1	3	A1 : 1	4
A2 : 1		A2 : 0		A2 : 0		A2 : 0		A2 : 1	
A3 : 1		A3 : 0		A3 : 0		A3 : 0		A3 : 0	

Table 3-6-7



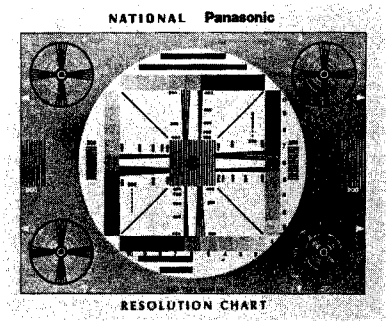
Spot Camera 1 Position

ADJUSTMENT PROCEDURE

1. TEST EQUIPMENT REQUIRED

The following test equipment is required for adjustment of CCTV camera WV-041/WV-046 and quad unit WJ-400.

- Oscilloscope
- Digital voltmeter (DVM)
- DC current meter
- Monochrome underscanned monitor
- Lens
  For WV-041 : C1616DNR (f1.6, 16mm, C-mount) or equivalent
  For WV-046 : National/Panasonic WV-LA16B (f1.6, 16mm, automatic iris, C-mount) or equivalent
- Resolution chart (Part No. YWV1400RB99)



2. DISASSEMBLING PROCEDURE FOR ADJUSTMENT

2-1 CCTV Camera WV-041/046

- Remove five screws fixing the rear panel and the cover and remove the rear panel and cover by sliding to backward.

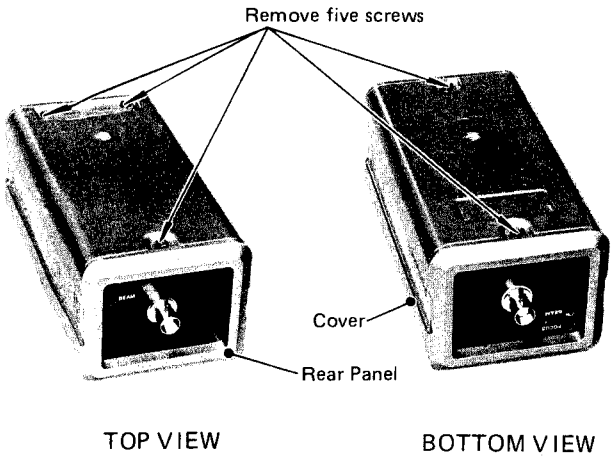


Fig. 2-1-1

2-2 Quad Unit WJ-400

- Remove five screws fixing the cover and remove the cover. (Fig. 2-2-1)

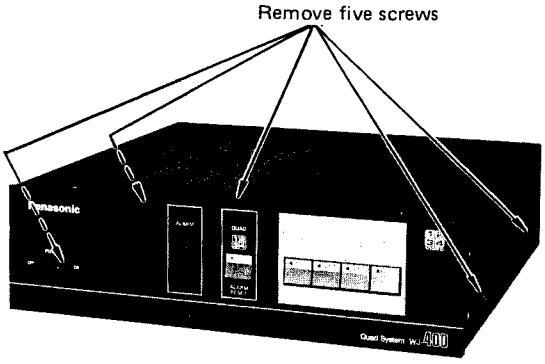


Fig. 2-2-1

- Remove four screws fixing the Process board. (Fig. 2-2-2)

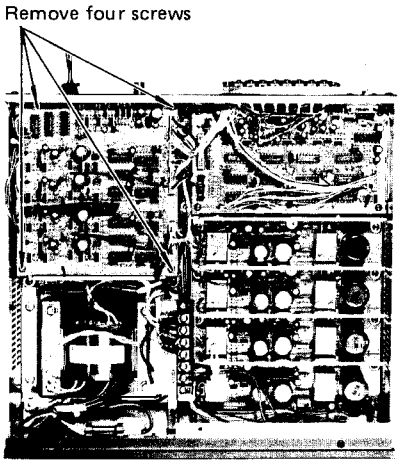


Fig. 2-2-2

- Open the Process board. (Fig. 2-2-3)

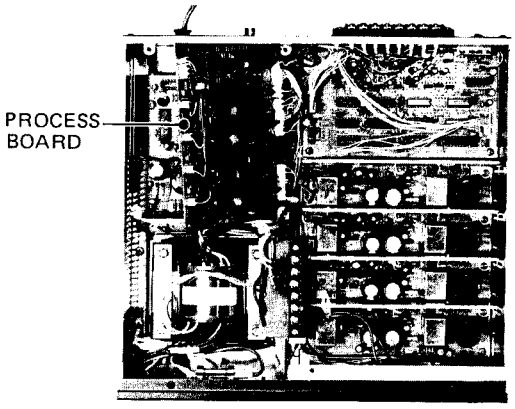


Fig. 2-2-3

3. PICK-UP TUBE REPLACEMENT

- Disassemble the camera referring to "2. DISASSEMBLING FOR ADJUSTMENT" on page 35.
- Remove the lens.
- Loosen the pick-up tube holding screw and push the pick-up tube out (in the direction of the lens). (Fig. 3-1)

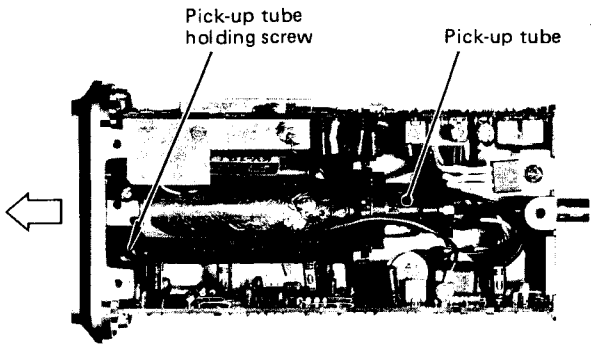


Fig. 3-1

- Insert the new pick-up tube (WV-041 ; vidicon, WV-046 : Newvicon) into the deflection coil and push it completely until it stops.

  Note : 1. When inserting the pick-up tube in place, be careful not to expose the target directly to bright light.
  2. Before inserting the Newvicon, note the value of target voltage Esj stamped on the Newvicon neck (Fig. 3-2). The value of Esj will be used for the target voltage adjustment.

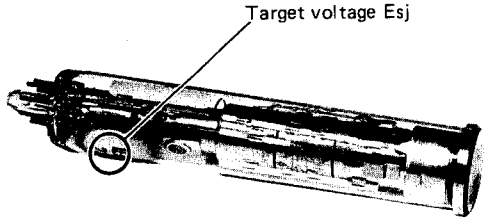


Fig. 3-2

3. Make sure that the blank-pin portion of pick-up tube positions on the right (viewed from the rear). (Fig. 3-3)

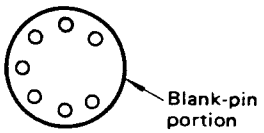


Fig. 3-3

- Tighten the pick-up tube holding screw (Fig. 3-1) to secure the pick-up tube in place.
- Clean the faceplate of pick-up tube with the lens cleaning tissue or cloth.
- Mount the lens.

4. SETTING UP FOR ADJUSTMENT

◆ Connection

- Connect the coaxial cable between the camera WV-041 or WV-046 and the Quad Unit WJ-400.
- Connect the video output of Quad Unit WJ-400 and the video input of underscanned monitor using a coaxial cable.
- Terminate the video input of monitor with 75 ohms.
- Position the resolution chart (YWV1400RB99) in front of the camera as shown in Fig. 4.

◆ Setting Up

- Test chart : Resolution chart (YWV1400RB99)
- Lighting : 600 lux (60 footcandles).
- Select the individual camera mode by pushing the CAMERA SELECTION switch of quad unit WJ-400.

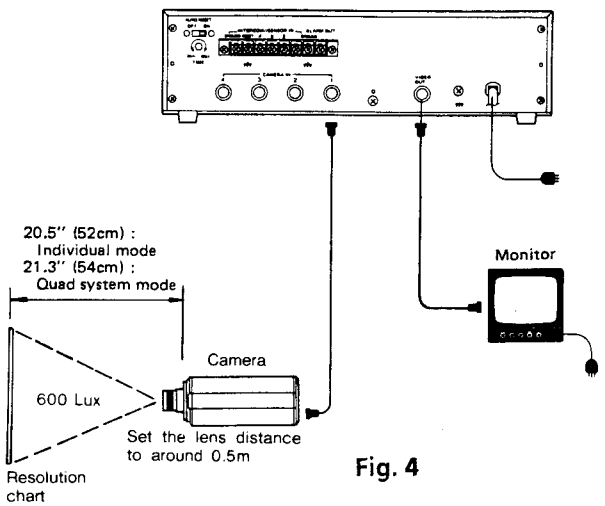


Fig. 4

5. ADJUSTMENT PROCEDURE

5-1 CCTV Camera Adjustment

(a) Confirmation of DC current adjustment

- Confirm the DC current of power supply in the Quad Unit WJ-400 by referring to (n) DC current adjustment on page 39.

(b) Target voltage adjustment for Newvicon - Model WV-046

Test point:	TP1 (TARGET)	Video board
Adjust:	VR403 (TARGET)	High voltage board

- Connect the digital voltmeter probe to TP1.
- Adjust VR403 (TARGET) so that the voltage at TP1 is equal to the Esj value stamped on the Newvicon neck. (See Fig. 3-2 on page 36.)

(c) Beam and focus coarse adjustment

Adjusts:	VR401 (BEAM)	Rear panel
	VR404 (FOCUS)	Rear panel
Observe:	B/W underscanned monitor	

- Select the individual camera mode by pushing the CAMERA SELECTION switch of quad unit WJ-400.
- Turn VR401 (BEAM) fully counterclockwise.
- Then turn it back slowly and stop it at a point where the picture just appears on the monitor.
- Adjust VR404 (FOCUS) for best resolution.

(d) Beam alignment adjustment

Adjusts:	VR404 (FOCUS)	Rear panel
	Alignment magnets	Coil Assembly
Observe:	B/W underscanned monitor	

- While turning VR404 (FOCUS) clockwise and counterclockwise, rotate the alignment magnets (Fig. 5-1-1) so that the center of picture will not move as the picture goes in and out of focus.
- After completing the above adjustment, adjust VR404 (FOCUS) for best resolution.

Steps denoted by shaded outolines do not have to be performed if only pick-up tube is replaced.

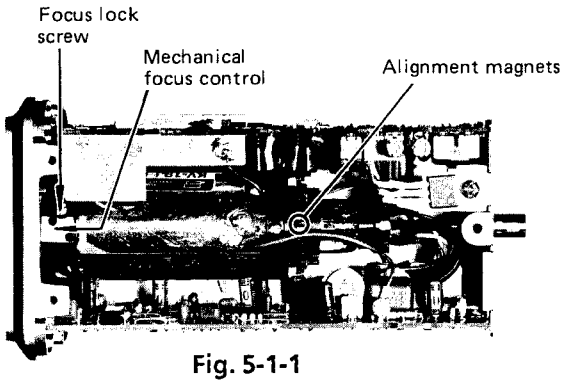


Fig. 5-1-1

(e) Mechanical focus adjustment

Adjust:	Mechanical focus control
Observe:	B/W underscanned monitor

- Aim the camera at a object further than 10m (33ft).
  Note : Lower the light level for the Newvicon model WV-046 so that the lens iris opens fully in order to have minimum depth of focus.
- Set the lens focus ring to the infinity (∞) position.
- Loosen the Focus Lock screw. (Fig. 5-1-1)
- Adjust MECHANICAL FOCUS control (Fig. 5-1-1) for the best focus.
- Tighten the Focus Lock Screw. (Fig. 5-1-1)

(f) Picture tilt adjustment

Adjust:	Coil Assembly
Observe:	B/W underscanned monitor

- Make sure that the camera is level with the chart.
- Loosen the deflection coil holding screw. (Fig. 5-1-2)
- Turn the deflection coil so that the image is straight.
- Tighten the deflection coil holding screw. (Fig. 5-1-2)

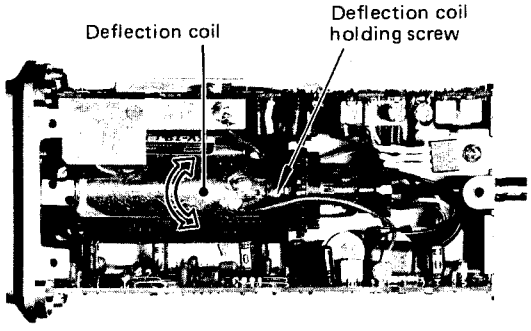
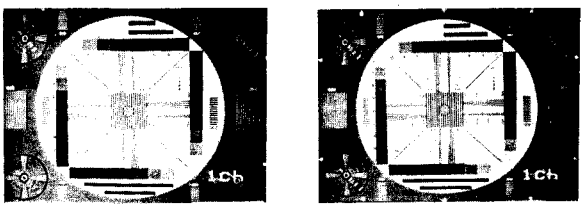


Fig. 5-1-2

(g) H.size and V.size adjustment for individual camera mode

Adjusts:	VR203 (H.SIZE-1)	Video board
	VR201 (V.SIZE-1)	Video board
Observe:	B/W underscanned monitor	

- Set the distance between the camera and chart to 20.5 inch (52cm) as shown in Fig. 4.
- Adjust VR203 (H.SIZE-1) and VR201 (V.SIZE-1) so that the reference arrow heads in the resolution chart line up with the edge of the raster on the underscanned monitor. (Fig. 5-1-3)



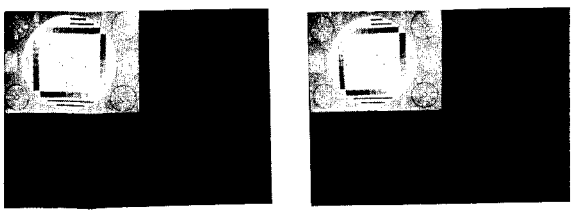
NO GOOD GOOD

Fig. 5-1-3

(h) H.size and V.size adjustment for quad system mode

Adjusts:	VR202 (V.SIZE-2)	Video board
	VR204 (H.SIZE-2)	Video board
Observe:	B/W underscanned monitor	

- Select the quad system mode by pushing the ALARM RESET switch of quad unit WJ-400.
- Set the distance between the camera and chart to 21.3 inch (54cm) as shown in Fig. 4.
- Adjust VR204 (H.SIZE-2) and VR202 (V.SIZE-2) so that the reference arrow heads in the resolution chart line up with the edge of the raster on the underscanned monitor. (Fig. 5-1-4)



NO GOOD GOOD

Fig. 5-1-4

Steps denoted by shaded outolines do not have to be performed if only pick-up tube is replaced.

(i) Pedestal level adjustment

Test point:	CN105 (VIDEO OUTPUT CONNECTOR)	Quad Unit WJ-400
Adjust:	VR1 (PEDESTAL)	Video board

- Select the individual camera mode by pushing the CAMERA SELECTION switch of quad unit WJ-400.
- Connect the oscilloscope to video output connector CN105 of quad unit WJ-400.
- Trigger the oscilloscope at H.rate (Use pin 3 of BI-1 on the High voltage board.).
- Cover the lens partially (approximately 1/3) with the lens cap to observe the black level.
- Adjust VR1 (PEDESTAL) so that the pedestal level is 0.07 ± 0.01 Vp-p. (Fig. 5-1-5)

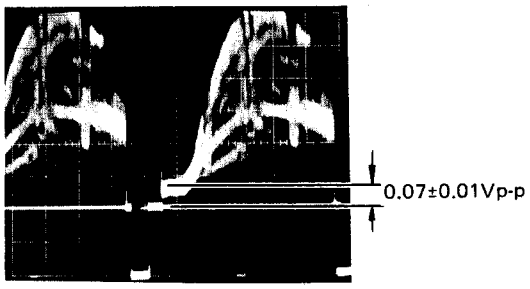


Fig. 5-1-5

(j) Target voltage adjustment for Vidicon - Model WV-041

Test point:	CN105 (VIDEO OUTPUT CONNECTOR)	Quad Unit WJ-400
Adjust:	VR403 (TARGET-1)	Video board
	VR402 (TARGET-2)	Video board

- Keep setting the CAMERA SELECTION switch of quad unit WJ-400 to the individual camera mode.
- Connect the oscilloscope to TP2.
- Trigger the oscilloscope at H.rate. (Use pin 3 of BI-1 on the High voltage board.)
- Adjust VR403 (TARGET-1) so that the video signal level becomes 0.7 ± 0.02Vp-p. (Fig. 5-1-6)

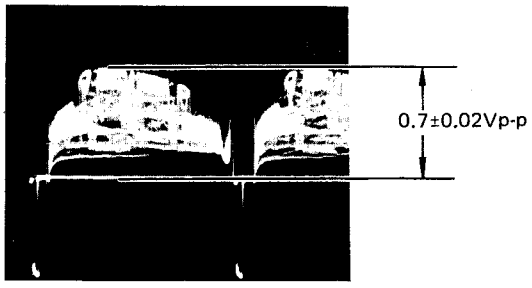


Fig. 5-1-6

- Select the quad system mode by pushing the ALARM RESET switch of quad unit WJ-400.
- Adjust VR402 (TARGET-2) so that the video signal level becomes 0.75 ± 0.02 Vp-p. (Fig. 5-1-7)

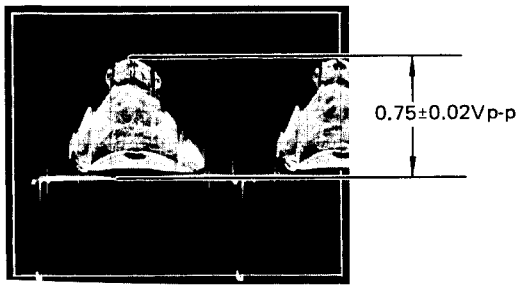


Fig. 5-1-7

(k) Beam adjustment

Test point:	TP5 (Y)	Video board
Adjust:	VR401 (BEAM)	Rear panel

- Keep setting the ALARM RESET switch of Quad Unit WJ-400 to the quad system mode.
- Connect the oscilloscope to TP5.
- Trigger the oscilloscope at H.rate. (Use pin 3 of BI-1 on the High voltage board.)
- Aim the camera at the scene which contains a small lamp or fluorescent lamp.
- Turn VR401 (BEAM) so that the signal level is 2.7 ± 0.1 Vp-p for vidicon camera WV-041 or the signal level is 3.8 ± 0.1 Vp-p for newvicon camera WV-046. (Fig. 5-1-8)

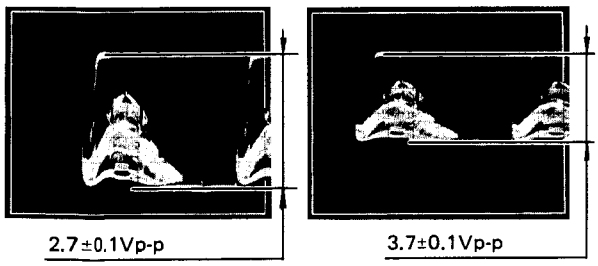


Fig. 5-1-8

Steps denoted by shaded outolines do not have to be performed if only pick-up tube is replaced.

(l) Focus adjustment

Adjust:	VR404 (FOCUS)	Rear panel

- Select the individual camera mode by pushing the CAMERA SELECTION switch of Quad Unit WJ-400.
- Adjust VR404 (FOCUS) for best resolution.

5-2 Quad Unit Adjustment

(m) + 30V adjustment

Test point:	TP3 (+ 30V)	Power board
Adjust:	VR1 (+ 30V ADJ)	Power board

- Turn OFF the power switch.
- Disconnect the coaxial cable between the camera and quad unit WJ-400.
- Turn ON the power switch.
- Connect digital voltmeter to TP3.
- Adjust VR1 (+ 30 ADJ) for 30 ± 0.2V.

(n) DC current adjustment

Adjusts:	VR101 (CURRENT ADJ-1)	Camera power board
	VR201 (CURRENT ADJ-2)	Camera power board
	VR301 (CURRENT ADJ-3)	Camera power board
	VR401 (CURRENT ADJ-4)	Camera power board
Observe:	DC current meter	

- Turn OFF the power switch.
- Connect the DC current meter between the camera and CAMERA INPUT 1 connector of Quad Unit WJ-400 (Fig. 5-2-1), and turn ON the power switch.
- Adjust VR101 (CURRENT ADJ-1) for 320mA ± 2mA.
- Change the connection for CAMERA INPUT 2 connector.
- Adjust VR201 (CURRENT ADJ-2) for 320mA ± 2mA.
- Change the connection for CAMERA INPUT 3 connector.
- Adjust VR301 (CURRENT ADJ-3) for 320mA ± 2mA.

Steps denoted by shaded outolines do not have to be performed if only pick-up tube is replaced.

- Change the connection for CAMERA INPUT 4 connector.
- Adjust VR401 (CURRENT ADJ-4) for 320mA ± 2mA.

  Note : Keep the power switch of Quad Unit WJ-400 to OFF position during connection.

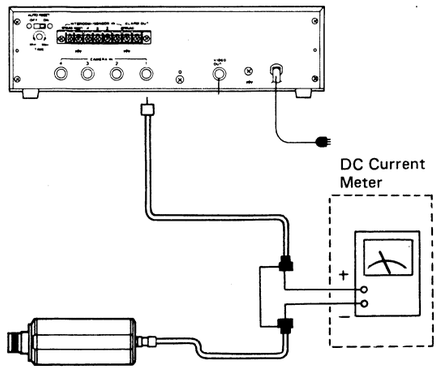


Fig. 5-2-1

(o) H.frequency adjustment

Test point:	TP2 (H.FREQ)	Sync board
Adjust:	CT1 (H.FREQ.ADJ)	Sync board

- Connect the digital voltmeter to TP2 (H. FREQ) on the Sync board.
- Adjust CT1 (H.FREQ.ADJ) for 2.5V ± 0.2V.

(p) Character phase adjustment

Test point:	TP8 (VIDEO OUT)	Process board
Adjust:	VR1 (CHARACTER PHASE)	Sync board

- Turn OFF the power switch.
- Disconnect the cable between the camera and quad unit WJ-400 and turn ON the power switch.
- Select the individual camera mode by pushing the CAMERA SELECTION switch.
- Connect the oscilloscope to TP8.
- Trigger the oscilloscope at H.rate. (Use pin 10 of IC9 on the Sync board.)
- Adjust VR1 (CHARACTER PHASE) so that the width between character signal and blanking becomes 9.0 ± 0.3 µsec. (Fig. 5-2-2)

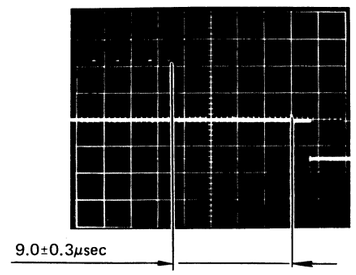


Fig. 5-2-2

(q) Pedestal adjustment

Test point:	TP8 (VIDEO OUT)	Process board
Adjust:	VR1 (PEDESTAL)	Process board

- Turn OFF the power switch.
- Disconnect the cable between the camera and the quad unit WJ-400.
- Turn ON the power switch.
- Select the quad system mode by pushing the ALARM RESET switch.
- Connect the oscilloscope to TP8.
- Trigger the oscilloscope at H.rate. (Use pin 10 of IC9 on the Sync board.)
- Adjust VR1 (PEDESTAL) so that the signal of lowest channel becomes 0.01 ± 0.002V. (Fig. 5-2-3)

  Note : Turn ON the quad unit for at least 5 minutes prior to adjustment.

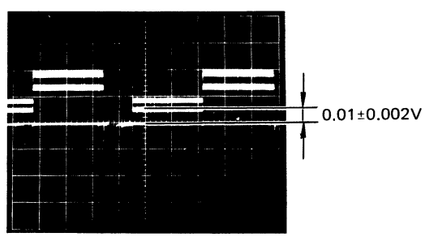


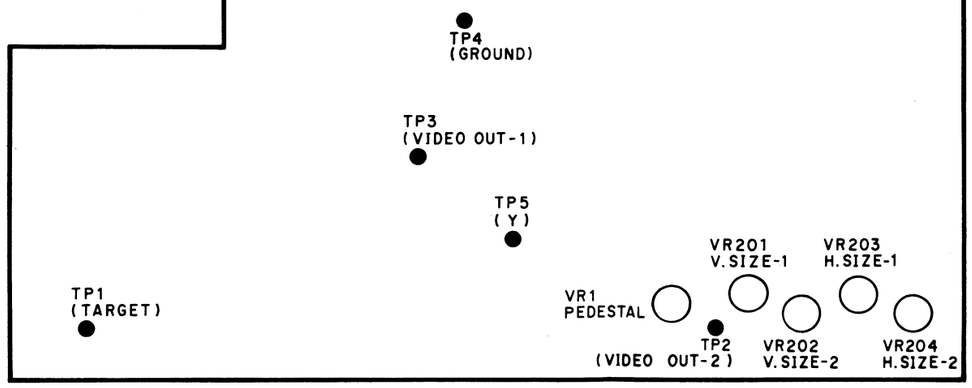
Fig. 5-2-3

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

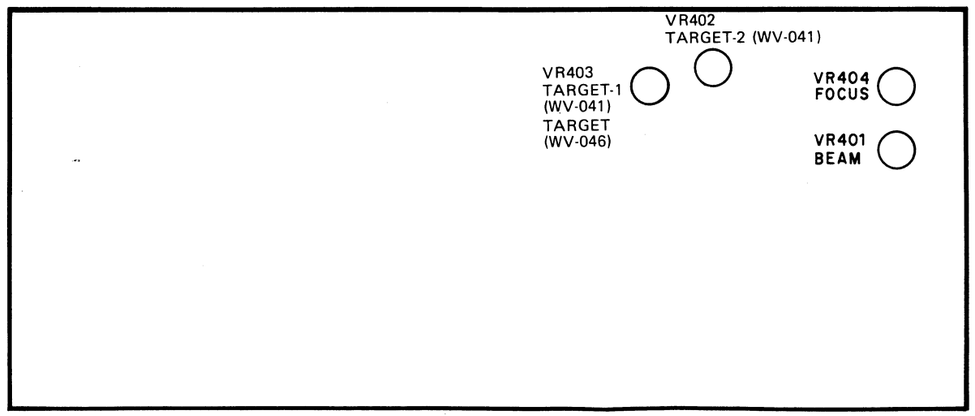
(For WV-041/WV-046)

(For

VIDEO BOARD



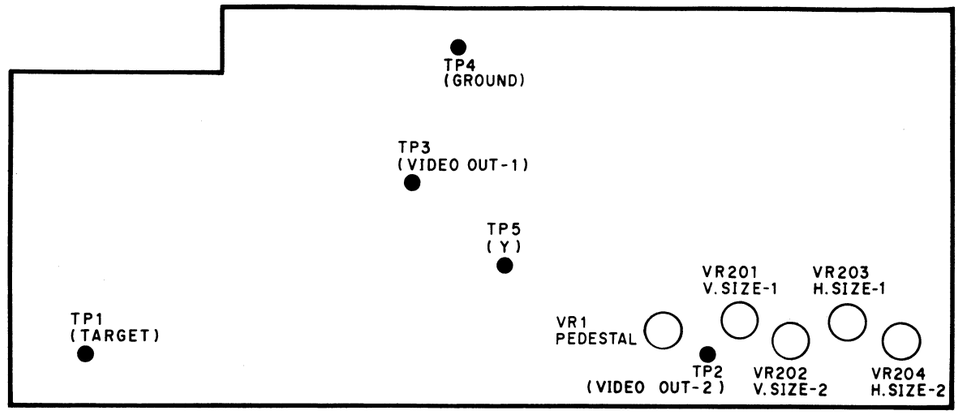
HIGH VOLTAGE BOARD



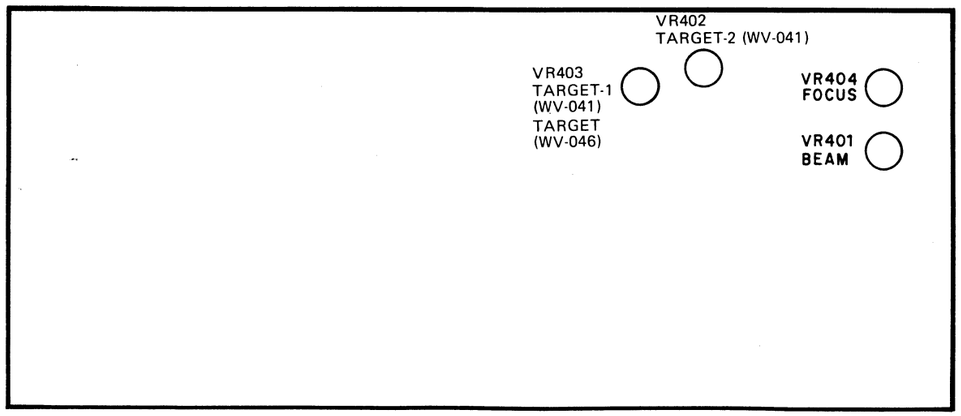
LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

(For WV-041/WV-046)

VIDEO BOARD

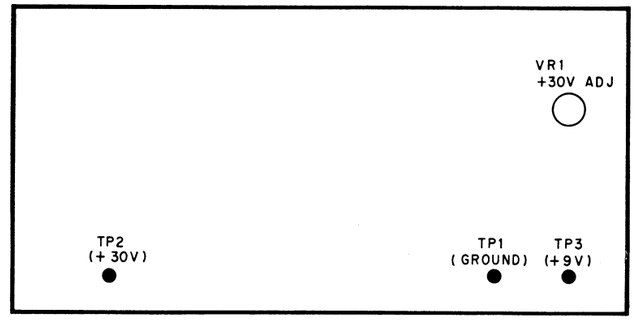


HIGH VOLTAGE BOARD

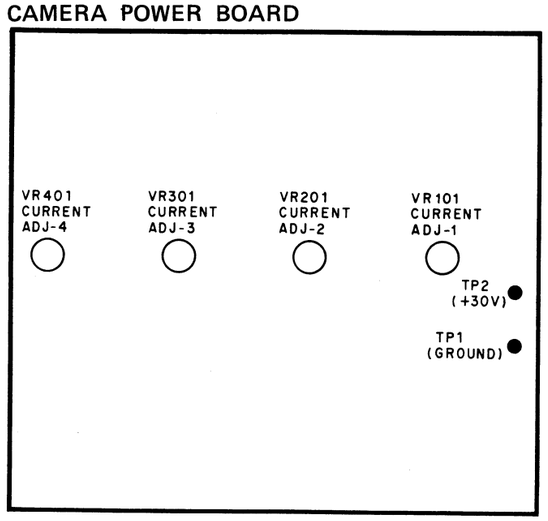


(For WJ-400)

POWER BOARD

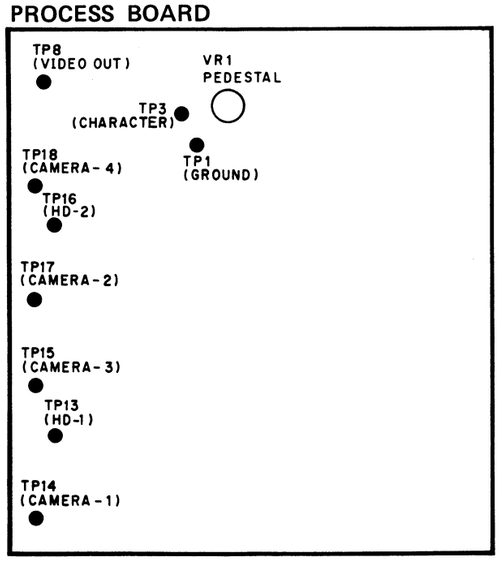


CAMERA POWER BOARD

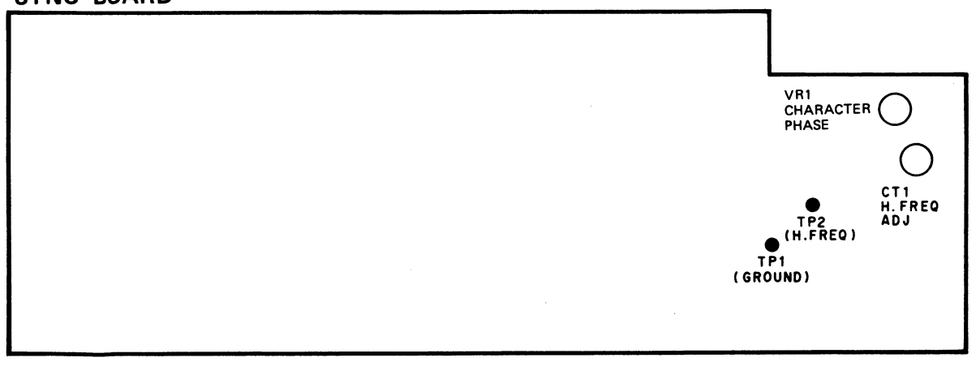


(For WJ-400)

PROCESS BOARD



SYNC BOARD



CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.

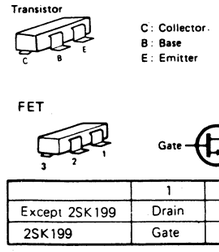
Transistor Number

Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

Example

WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

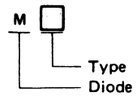
Appearance and Symbols



	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

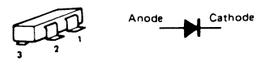
The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

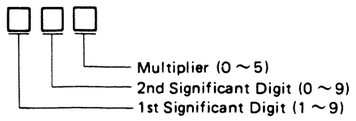
Appearance and Symbols



	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 ⟶ 33×10^0 = 33 ohms
561 ⟶ 56×10^1 = 560 ohms
123 ⟶ 12×10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

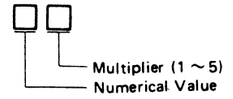
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 ⟶ 0.5 pF 2.5 ⟶ 2.5 pF
75 ⟶ 0.75 pF 33 ⟶ 33 pF
1 ⟶ 1 pF 82 ⟶ 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	V
A	
B	
C	
D	
E	
F	
G	
H	
J	
K	
L	
M	

* Letters I ar

EXAMPLE:

A1 ⟶
N2 ⟶
S3 ⟶

5. Precautions in

1. Make sure tha the chip.
2. Use tweezers surface.
3. Do not re-use
4. Do not rub th
5. Do not subjec
6. It is recomme be used.
7. The solder wi commended.
8. Do not heat t
9. Maintain tem when solderin

5-1 Removal (T

1. Add the solc for chip trans
2. While attach the chip (th below, remov Note. Be ca

C

CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.

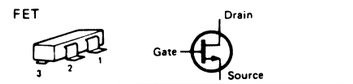
Transistor Number

Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

Example

WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

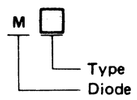
Appearance and Symbols



	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

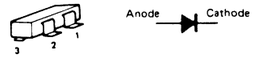
The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

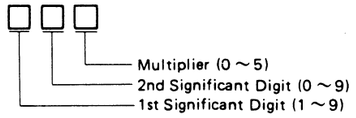
Appearance and Symbols



	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 ⟶ 33×10^0 = 33 ohms
561 ⟶ 56×10^1 = 560 ohms
123 ⟶ 12×10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

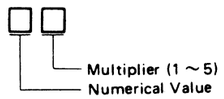
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 ⟶ 0.5 pF 2.5 ⟶ 2.5 pF
75 ⟶ 0.75 pF 33 ⟶ 33 pF
1 ⟶ 1 pF 82 ⟶ 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used.

EXAMPLE:

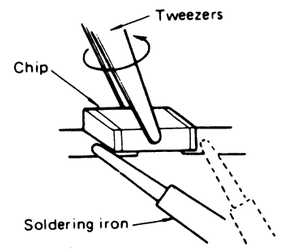
A1 ⟶ 10×10^1 = 100 pF
N2 ⟶ 33×10^2 = 3300 pF
S3 ⟶ 47×10^3 = 47000 pF

5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

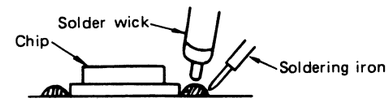
5-1 Removal (Transistor, Diode, Resistor and Capacitor)

1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
   Note. Be careful not to damage other chips.

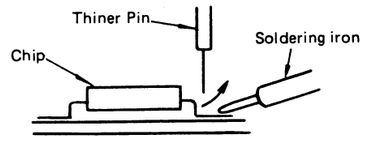


5-2 Removal (IC)

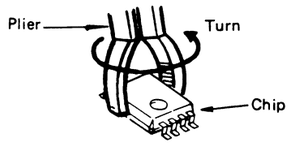
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.

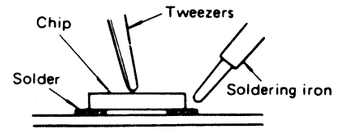


3. Remove IC turning it with plier.

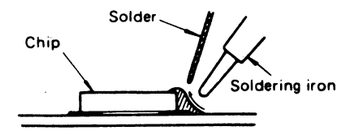


5-3 Mounting

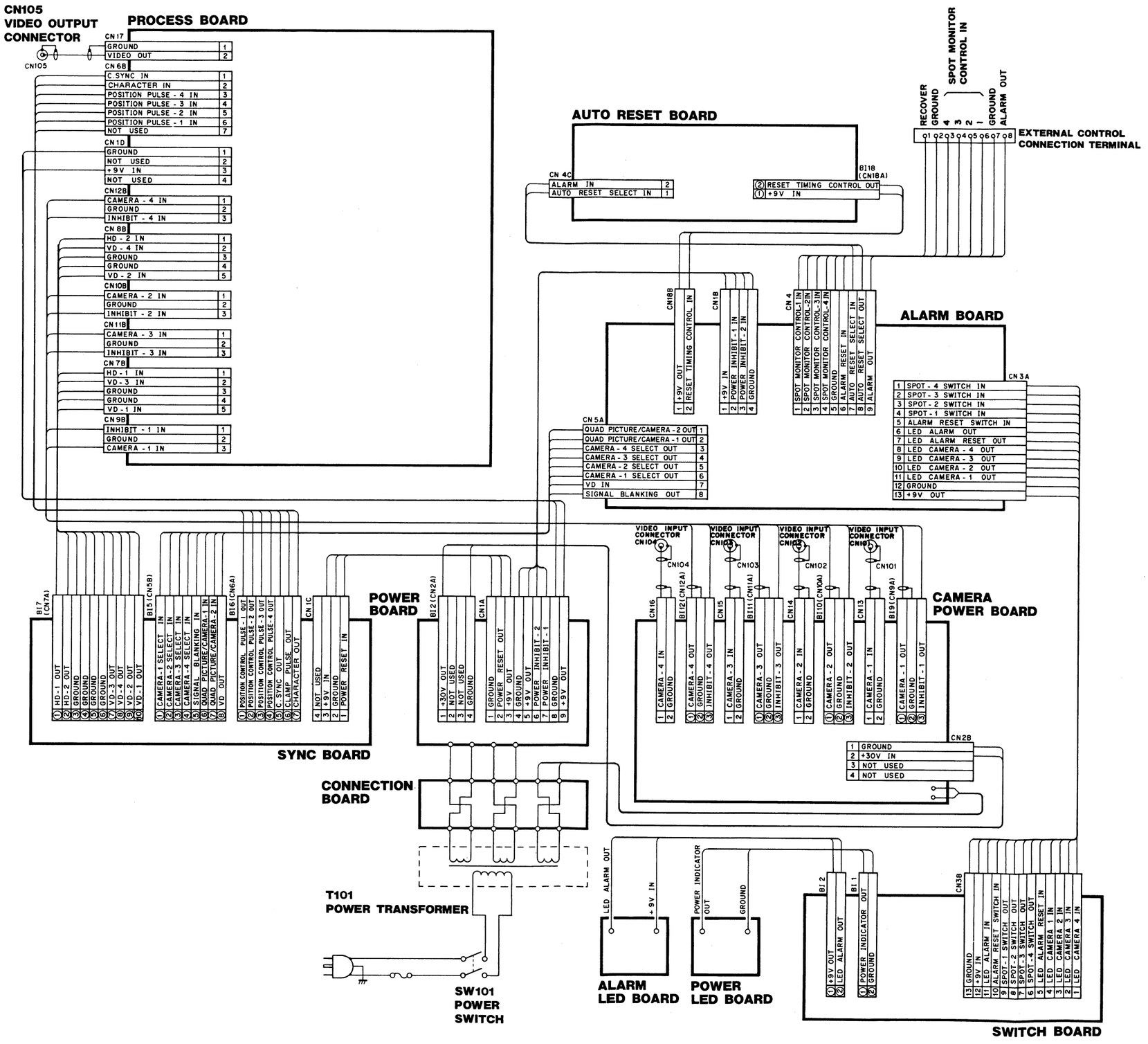
1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.



3. Solder both ends of chip (three leads for chip transistor).

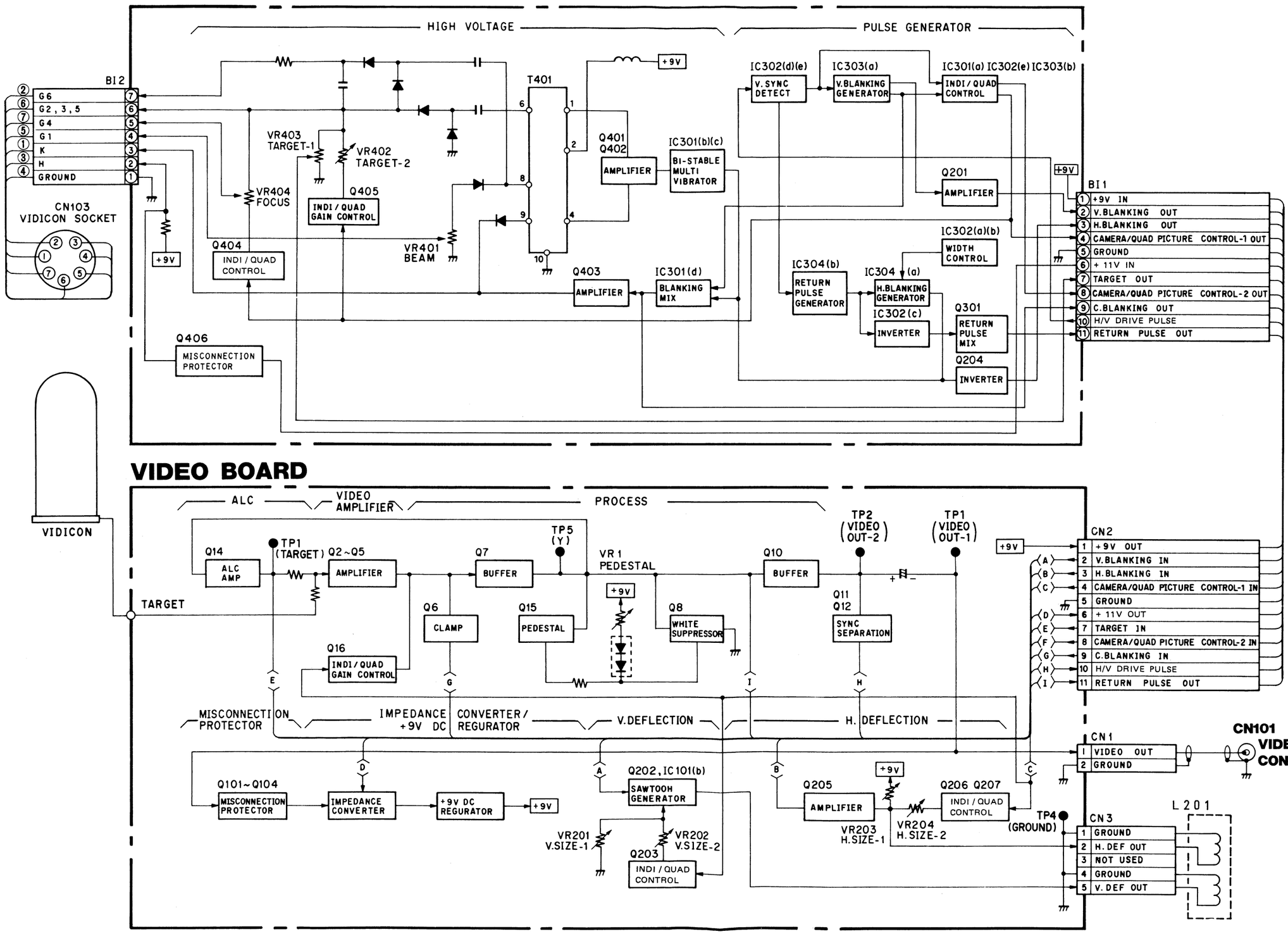


WIRING DIAGRAM OF WJ-400



BLOCK DIAGRAM OF WV-041

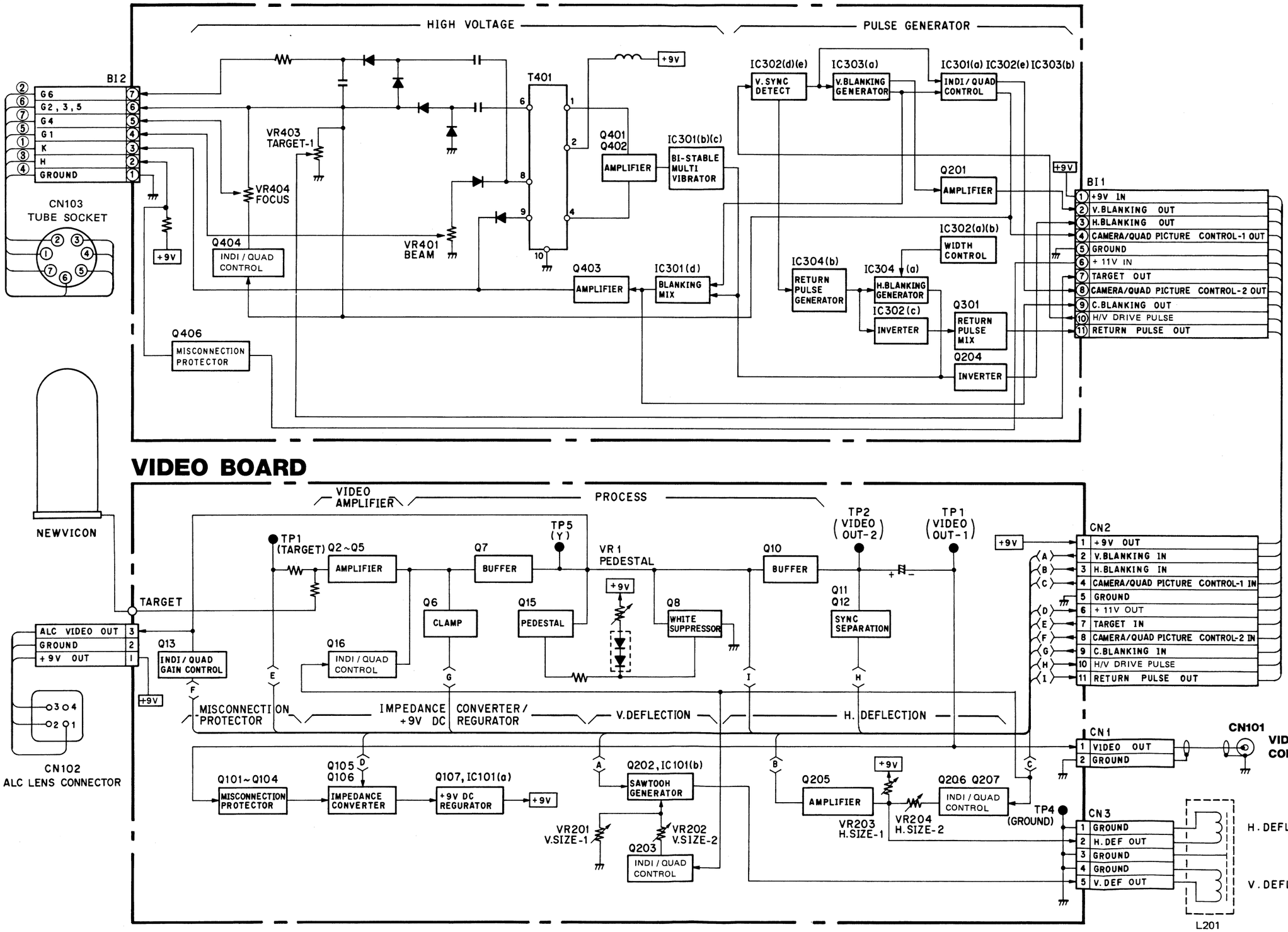
HIGH VOLTAGE BOARD



VIDEO BOARD

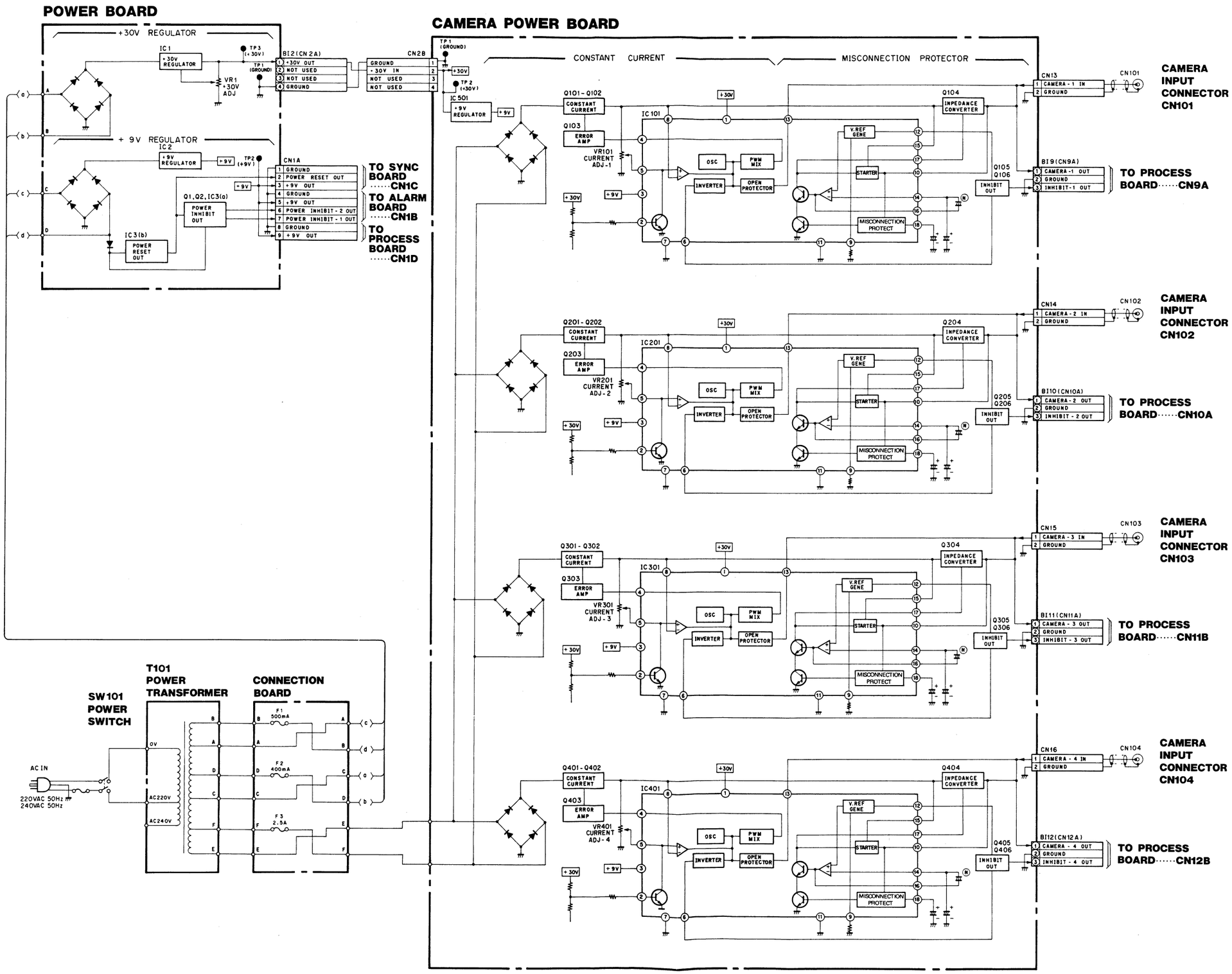
BLOCK DIAGRAM OF WV-046

HIGH VOLTAGE BOARD

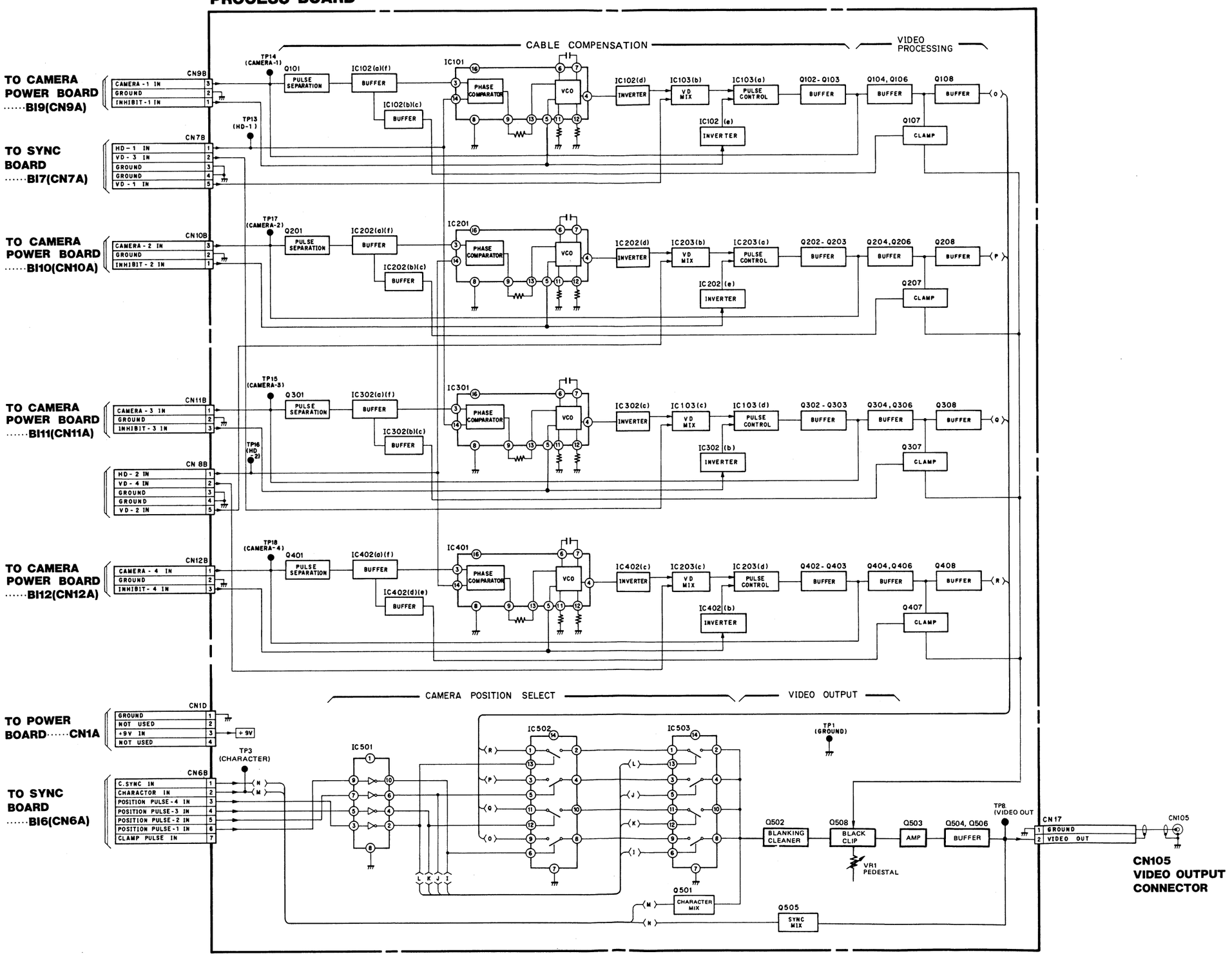


VIDEO BOARD

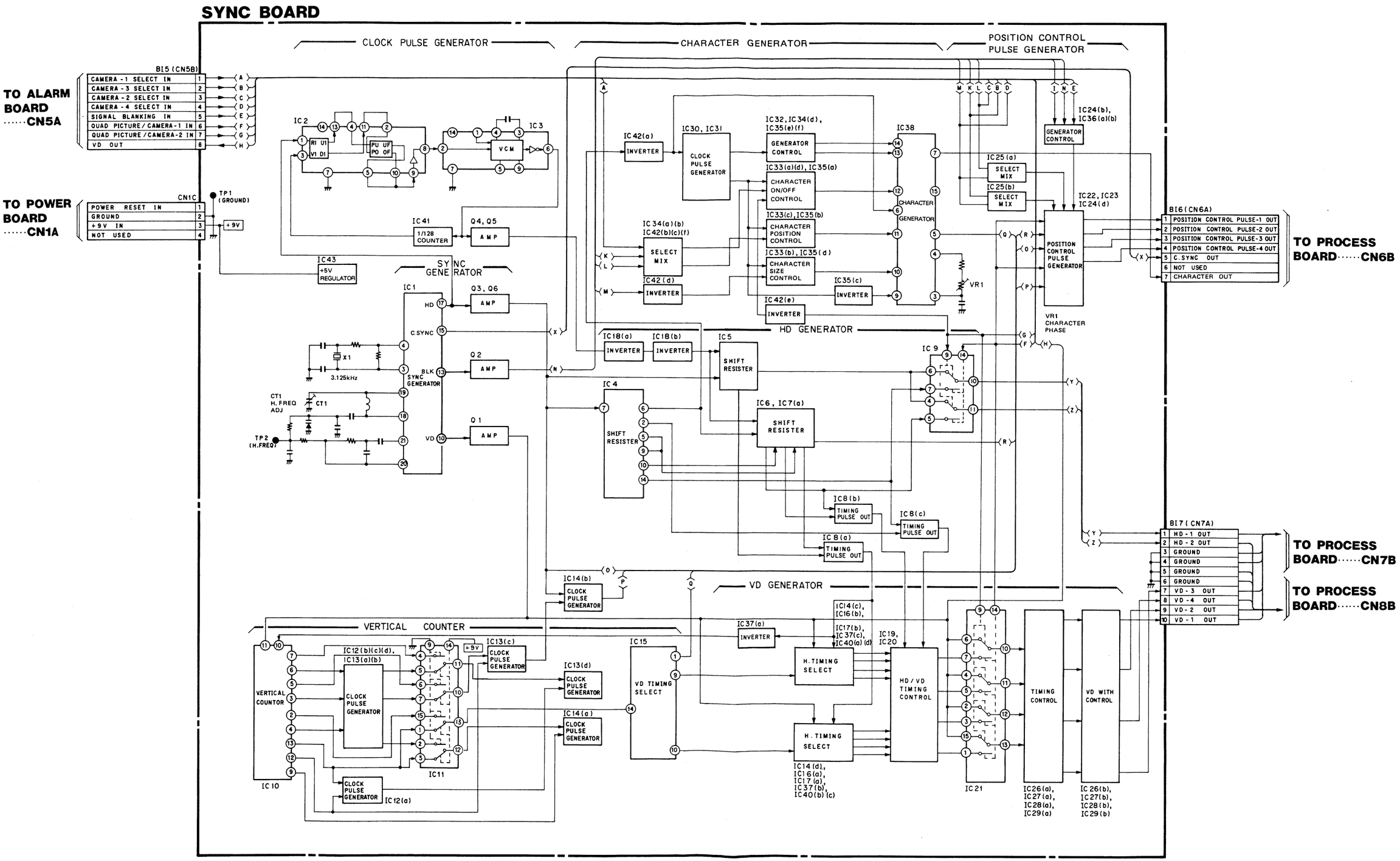
BLOCK DIAGRAM OF POWER BOARD, CAMERA POWER BOARD, CONNECTION BOARD (WJ-400)



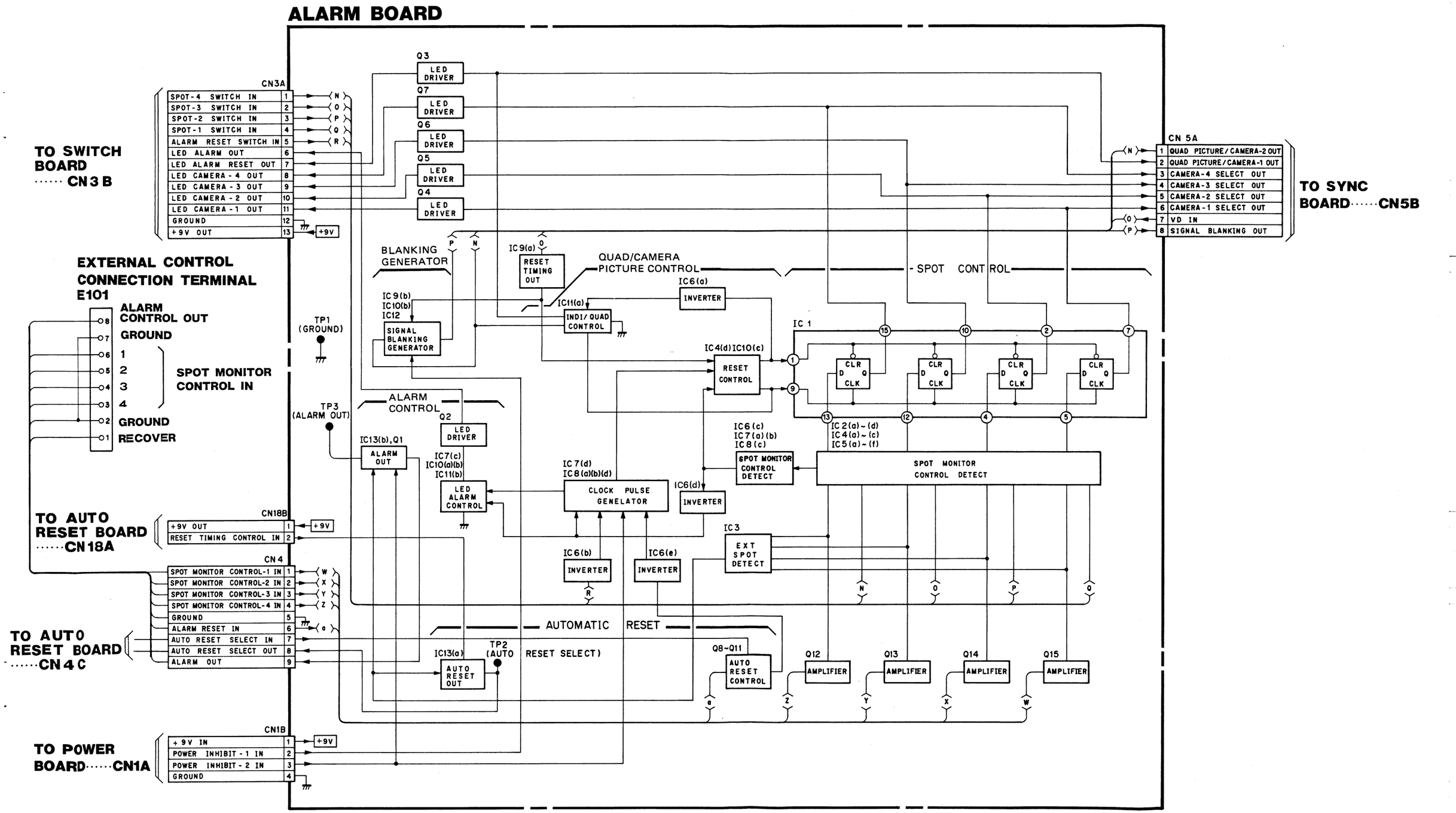
BLOCK DIAGRAM OF PROCESS BOARD (WJ-400)



BLOCK DIAGRAM OF SYNC BOARD (WJ-400)



BLOCK DIAGRAM OF ALARM BOARD (WJ-400)



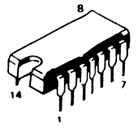
Video Board

IC101	NJM3415D	C4, 5	D7	OA91	A2, B2
Q1	2SK321-Q	(1F) A2	D101	RD5.1JT1B2	C3
Q2	2SC2404-CD	(U) A3	D102	RD5.1JT1B2	B4
Q3	2SA1022-C	(E) A3	D201	EU01Z	C5
Q4	2SC2404-CD	(U) A3	D202	EU01Z	C6
Q5	2SA1022-C	(E) A3			
Q6	2SC2404-CD	(U) A4			
Q7	2SD601-QR	(Y) A4			
Q8	2SB709-Q	(A) A4			
Q10	2SB709-Q	(A) A5			
Q11	2SD601-QR	(Y) A5			
Q12	2SB709-Q	(A) A5			
Q14	2SC2405STU	(S) A1			
Q15	2SD601-QR	(Y) A4			
Q16	2SD601-QR	(Y) C6			
Q101	2SD601-QR	(Y) B2			
Q102	2SD602-Q	(W) B3			
Q103	2SD602-Q	(W) C2			
Q104	2SD601-QR	(Y) C3			
Q105	2SD601-QR	(Y) B3			
Q106	2SC1398-QR	B3			
Q107	2SC2590-QR	C4			
Q202	2SB709-Q	(A) B5			
Q203	2SD601-QR	(Y) C5			
Q205	2SC2590-QR	B5			
Q206	2SB709-Q	(A) C6			
Q207	2SD601-QR	(Y) C6			
D1	MA151K	(MH) A3			
D2	MA151K	(MH) B3			
D4	MA153TW	(MC) A4			
D6	OA91	A2, B2			

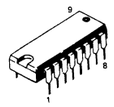
High Voltage Board

IC301	HD74LS00P		F3
IC302	YWMSM4049		F2
IC303	HD74HC4538BP		F3, 4
IC304	HD74HC4538BP		E2
Q201	2SD601-QR	(Y)	E4
Q204	2SB710-QRS	(C)	E3
Q301	2SD601-QR	(Y)	F3
Q401	2SD602-Q	(W)	E5
Q402	2SD602-Q	(W)	E5
Q403	2SD601A-QR	(Z)	E3
Q404	2SD601-QR	(Y)	F6, G6
Q405	2SD601-QR	(Y)	G6
D301	RD5.1JT1B2		E2
D302	LN23L		E1
D303	MA151WA	(MN)	F3
D304	MA151K	(MH)	F2
D305	MA151K	(MH)	F2
D401	EM01Z		E4
D402	EU01AV0		F6
D403	EU01AV0		E5
D404	EU01AV0		E5
D405	EU01AV0		E5
D406	EU01AV0		E5

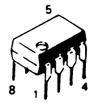
HD74LS00P



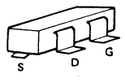
YWMSM4049
HD74HC4538BP



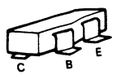
NJM3415D



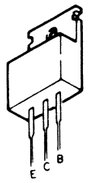
2SK321-Q



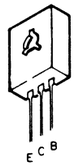
2SA1022-C
2SC2404-CD
2SC2405STU
2SB709-Q
2SB710-QRS
2SD601-QR
2SD601A-QRS
2SD602-Q



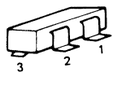
2SC1398-QR



2SC2590-QR

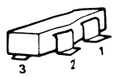


MA151WA



1 : Anode
2 : Anode
3 : Cathode

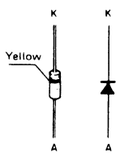
MA151K



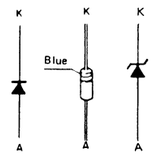
MA153TW

1 : NC
2 : Anode
3 : Cathode

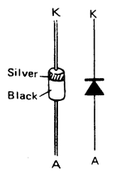
OA91



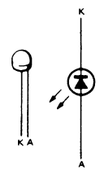
RD5,1JT1B2



EU01AVO
EU01Z

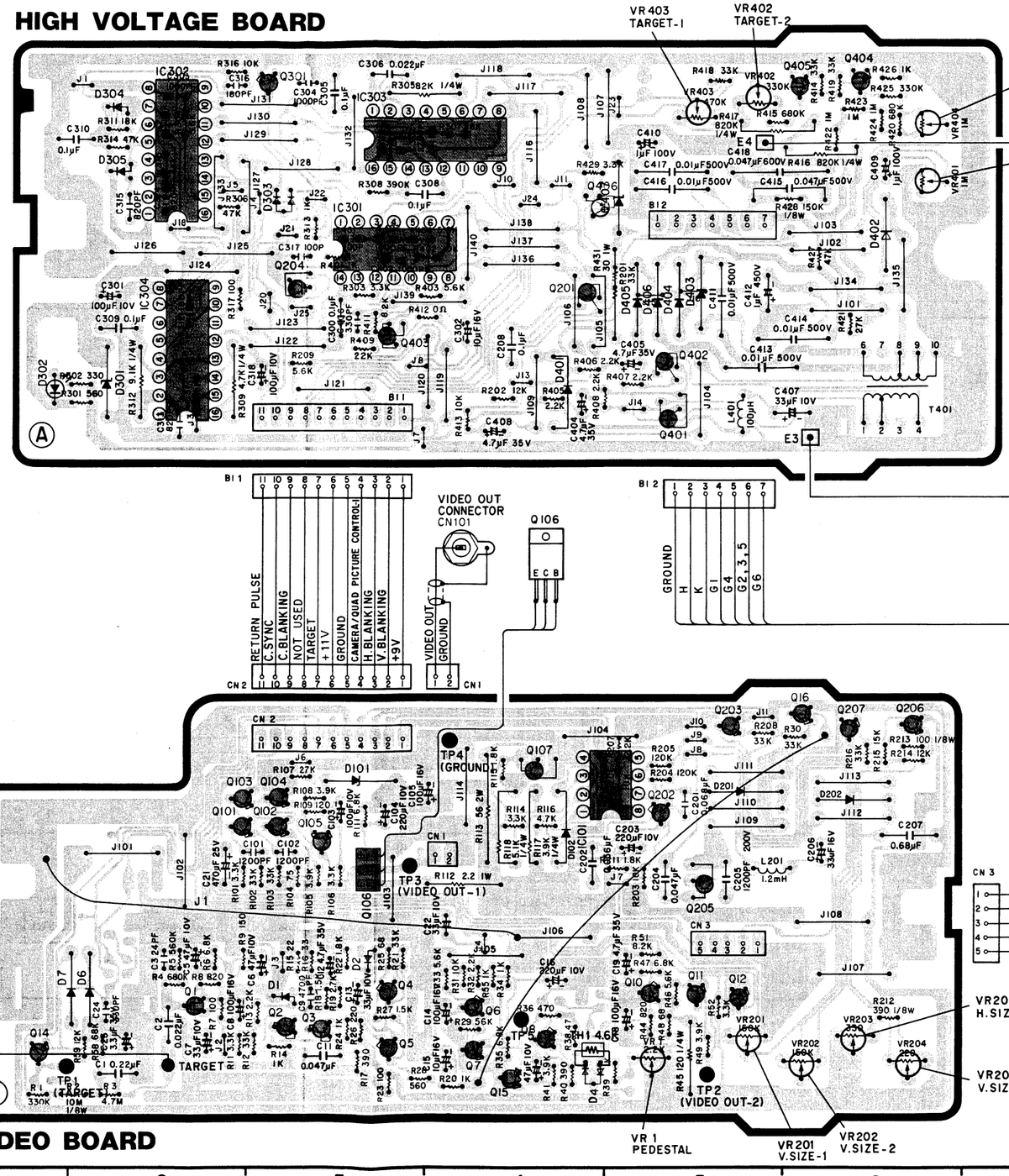


LN23L



CONDUCTOR VIEW OF WV-041

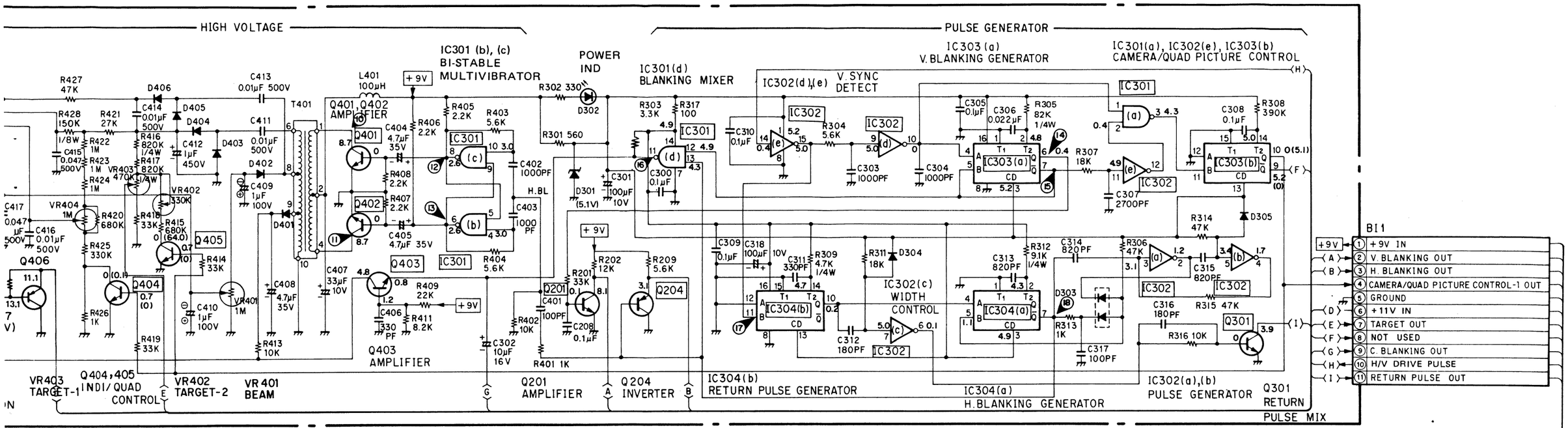
HIGH VOLTAGE BOARD



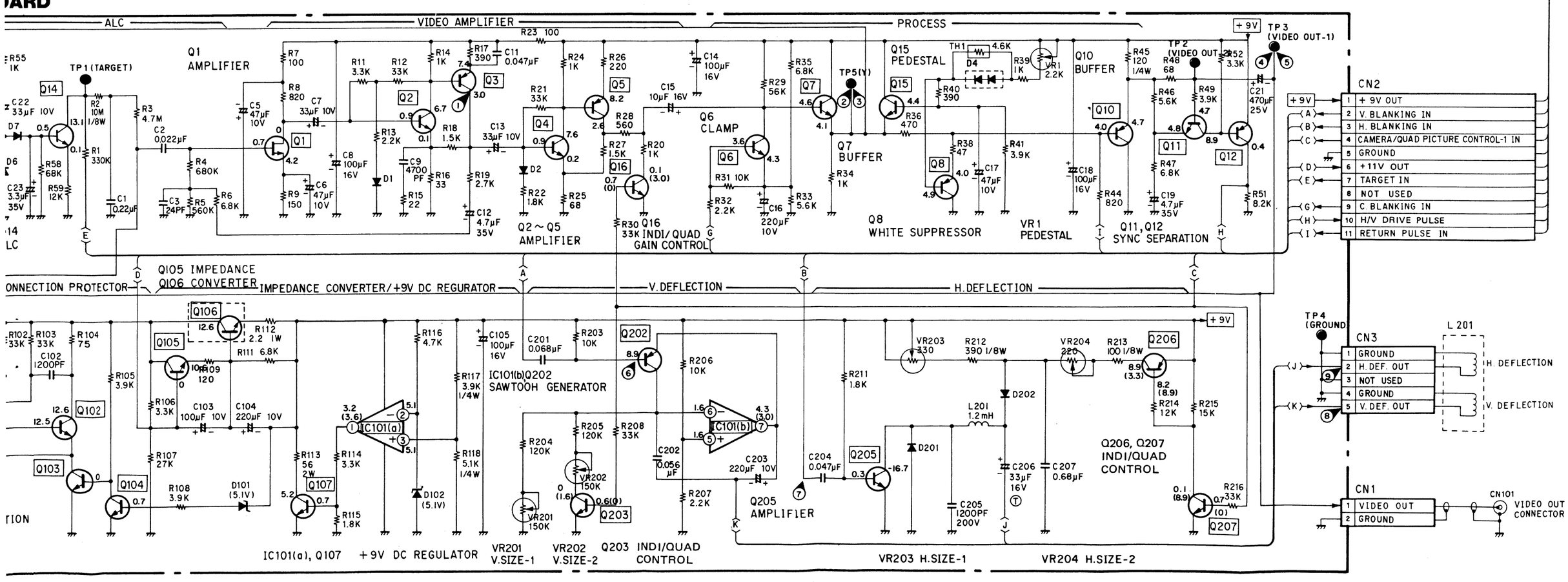
VIDEO BOARD

SCHEMATIC DIAGRAM OF WV-041

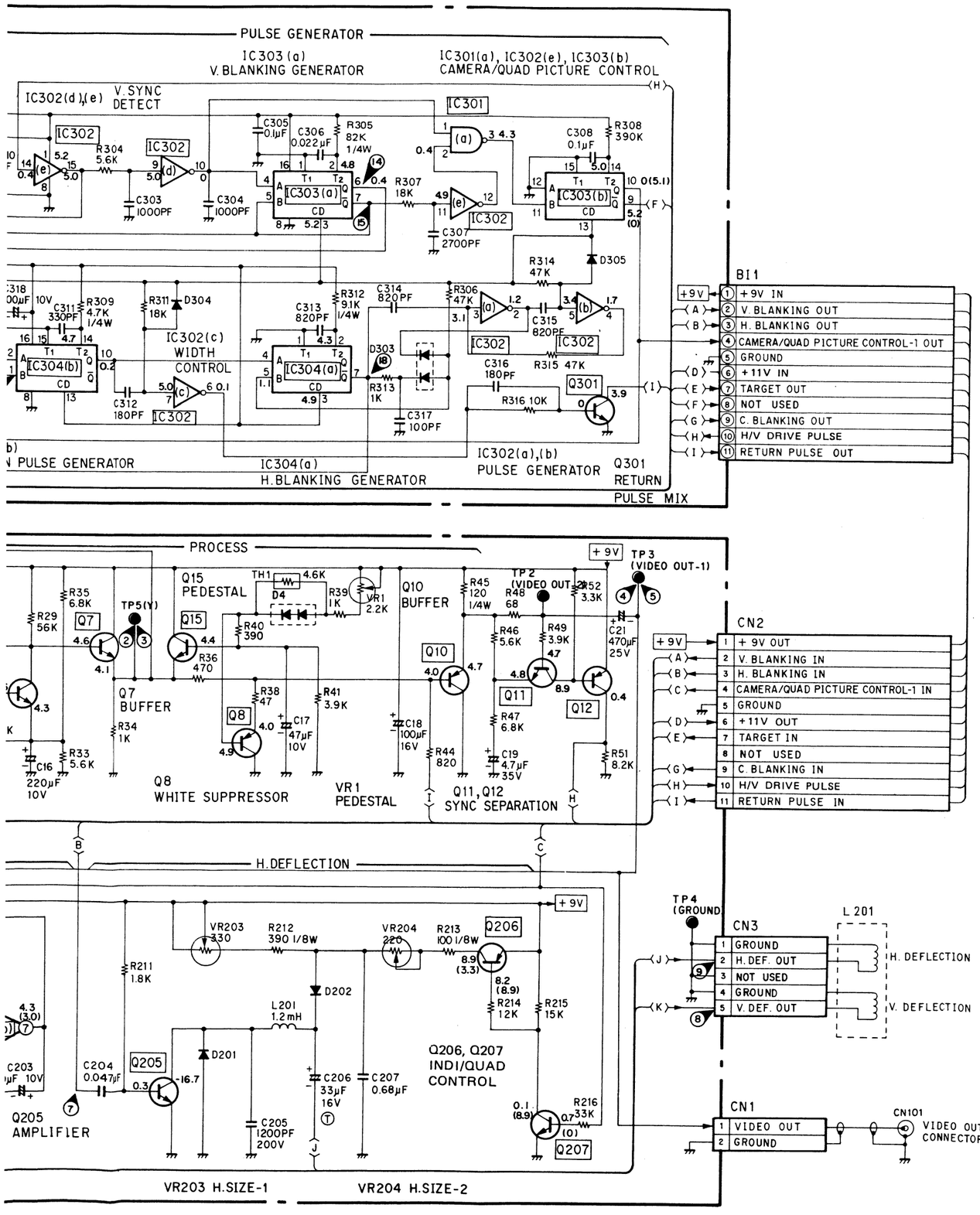
.TAGE BOARD



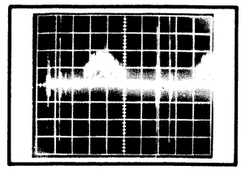
ARD



SCHEMATIC DIAGRAM OF WV-041

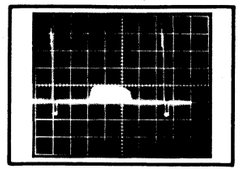


1. 1V/DIV, 10μs/DIV



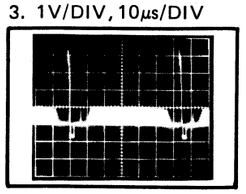
Quad

2. 1V/DIV, 10μs/DIV



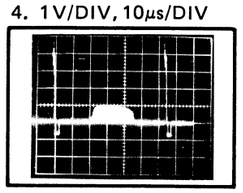
Quad

3. 1V/DIV, 10μs/DIV



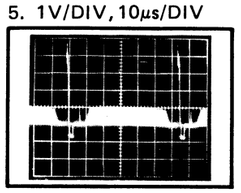
Normal

4. 1V/DIV, 10μs/DIV



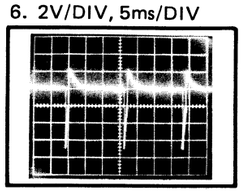
Quad

5. 1V/DIV, 10μs/DIV

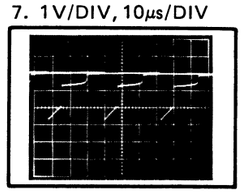


Normal

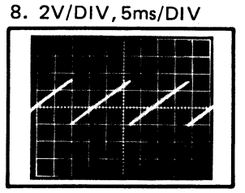
6. 2V/DIV, 5ms/DIV



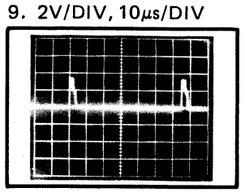
7. 1V/DIV, 10μs/DIV



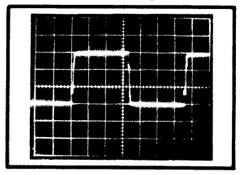
8. 2V/DIV, 5ms/DIV



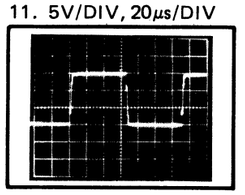
9. 2V/DIV, 10μs/DIV



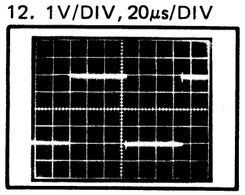
10. 5V/DIV, 20μs/DIV



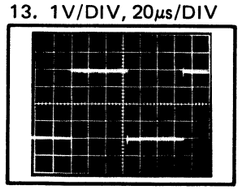
11. 5V/DIV, 20μs/DIV



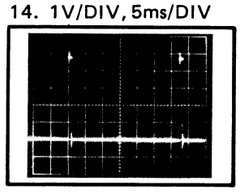
12. 1V/DIV, 20μs/DIV



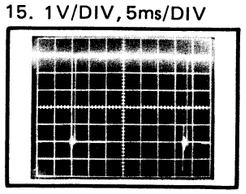
13. 1V/DIV, 20μs/DIV



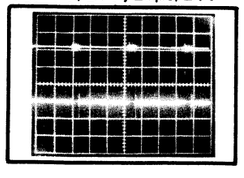
14. 1V/DIV, 5ms/DIV



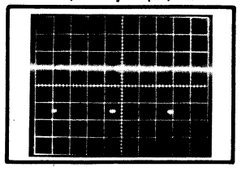
15. 1V/DIV, 5ms/DIV



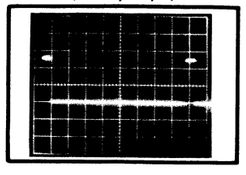
16. 1V/DIV, 20μs/DIV



17. 2V/DIV, 10μs/DIV



18. 2V/DIV, 10μs/DIV



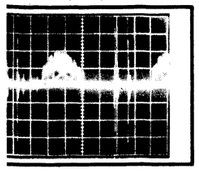
Video Board

IC101	NJM3415D		A3, 4
Q1	2SK321-Q	(1F)	B2
Q2	2SC2404-CD	(U)	B3
Q3	2SA1022-C	(E)	C3
Q4	2SC2404-CD	(U)	B4
Q5	2SA1022-C	(E)	B4
Q6	2SC2404-CD	(U)	B4
Q7	2SD601-QR	(Y)	B5
Q8	2SB709-Q	(A)	B5
Q10	2SB709-Q	(A)	B6
Q11	2SD601-QR	(Y)	B6
Q12	2SB709-Q	(A)	B6
Q14	2SC2405STU	(S)	B2
Q15	2SD601-QR	(Y)	B5
Q16	2SD601-QR	(Y)	B4
Q101	2SD601-QR	(Y)	A1
Q102	2SD602-Q	(W)	A2
Q103	2SD602-Q	(W)	A2
Q104	2SD601-QR	(Y)	A2
Q105	2SD601-QR	(Y)	A2
Q106	2SC1398-QR		B2
Q107	2SC2590-QR		A3
Q202	2SB709-Q	(A)	A4
Q203	2SD601-QR	(Y)	A4
Q205	2SC2590-QR		A5
Q206	2SB709-Q	(A)	A6
Q207	2SD601-QR	(Y)	A6
D1	MA151K	(MH)	B3
D2	MA151K	(MH)	B3
D4	MA153TW	(MC)	C5
D6	OA91		B1
D7	OA91		B1
D101	RD5.1JT1B2		A2
D102	RD5.1JT1B2		A3
D201	EU01Z		A5
D202	EU01Z		A5

High Voltage Board

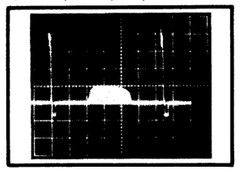
IC301	HD74LS00P		D3, 4, 6
IC302	YWMSM4049		C5, D4, 5, 6
IC303	HD74HC4538BP		D5, 6
IC304	HD74HC4538BP		C4, 5
Q201	2SD601-QR	(Y)	C4
Q204	2SB710-QRS	(C)	C4
Q301	2SD601-QR	(Y)	C6
Q401	2SD602-Q	(W)	D3
Q402	2SD602-Q	(W)	D3
Q403	2SD601A-QR	(Z)	C3
Q404	2SD601-QR	(Y)	C2
Q405	2SD601-QR	(Y)	D2
D301	RD5.1JT1B2		D4
D302	LN23L		D4
D303	MA151WA	(MN)	C6
D304	MA151K	(MH)	D5
D305	MA151K	(MH)	D6
D401	EM01Z		D3
D402	EU01AV0		D2
D403	EU01AV0		D2
D404	EU01AV0		D2
D405	EU01AV0		D2
D406	EU01AV0		D2

V/DIV, 10μs/DIV



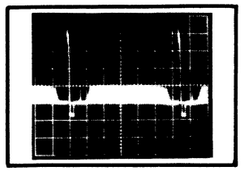
Quad

2. 1V/DIV, 10μs/DIV



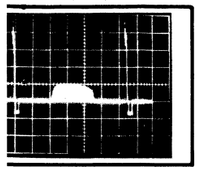
Quad

3. 1V/DIV, 10μs/DIV



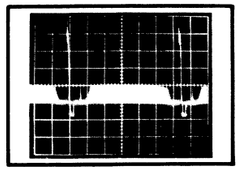
Normal

V/DIV, 10μs/DIV



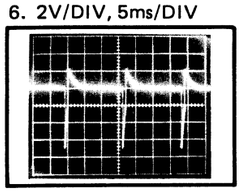
Quad

5. 1V/DIV, 10μs/DIV

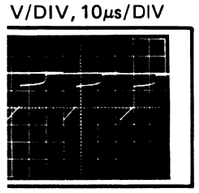


Normal

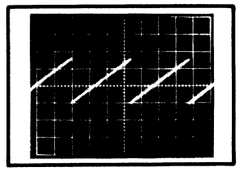
6. 2V/DIV, 5ms/DIV



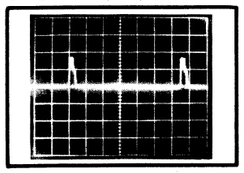
V/DIV, 10μs/DIV



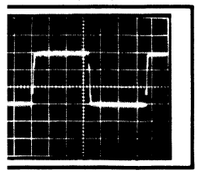
8. 2V/DIV, 5ms/DIV



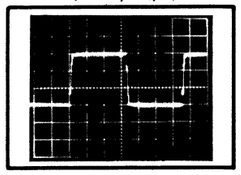
9. 2V/DIV, 10μs/DIV



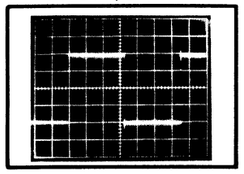
5V/DIV, 20μs/DIV



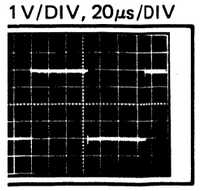
11. 5V/DIV, 20μs/DIV



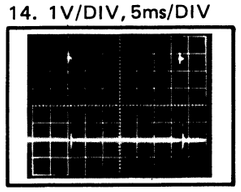
12. 1V/DIV, 20μs/DIV



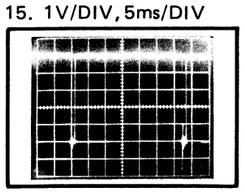
1V/DIV, 20μs/DIV



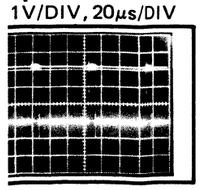
14. 1V/DIV, 5ms/DIV



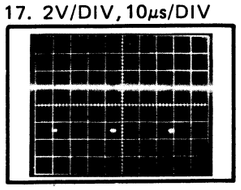
15. 1V/DIV, 5ms/DIV



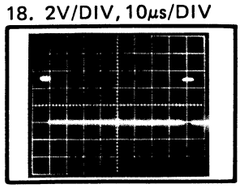
1V/DIV, 20μs/DIV



17. 2V/DIV, 10μs/DIV

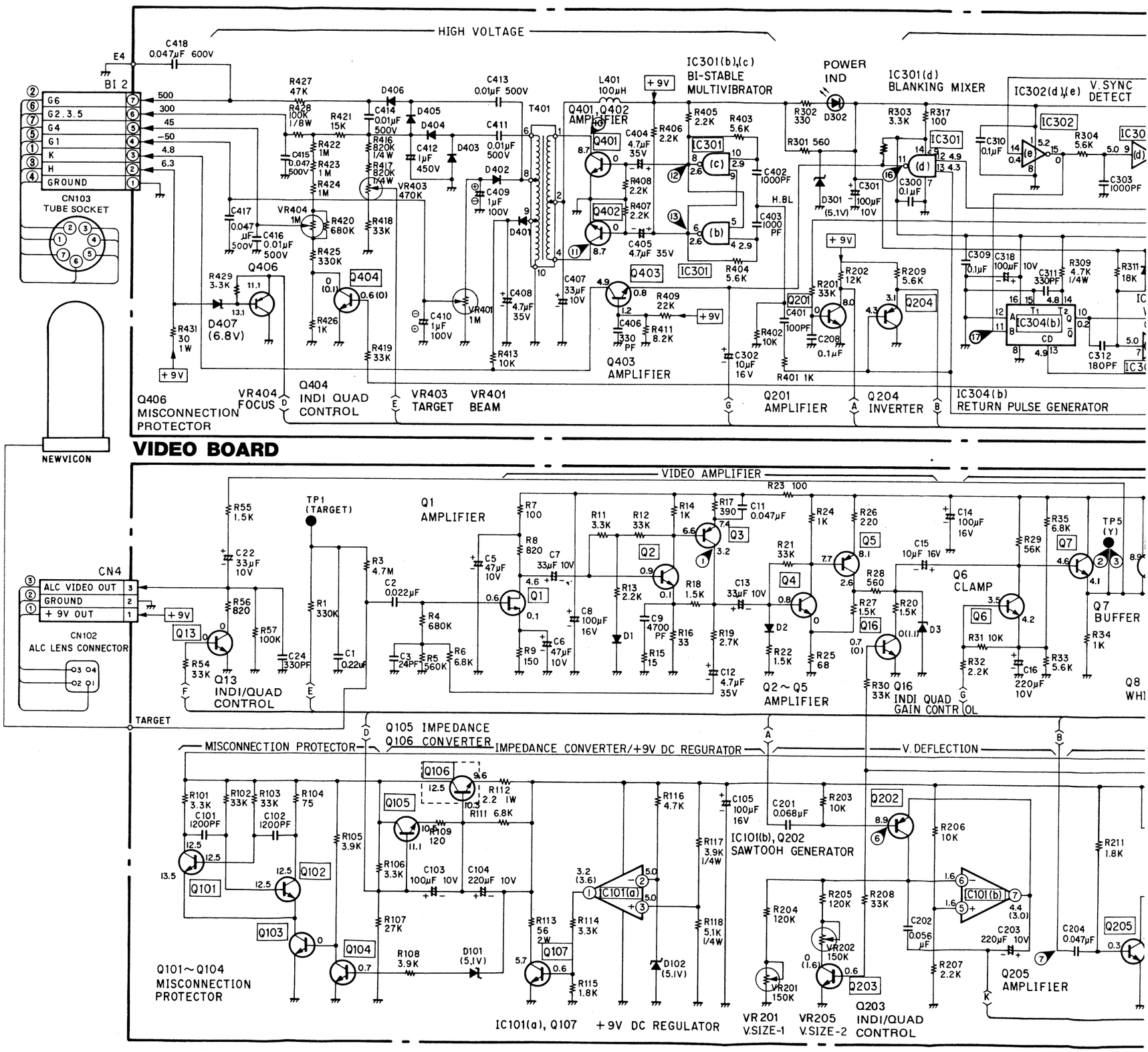


18. 2V/DIV, 10μs/DIV



SCHEMATIC DIAGRAM OF WV-046

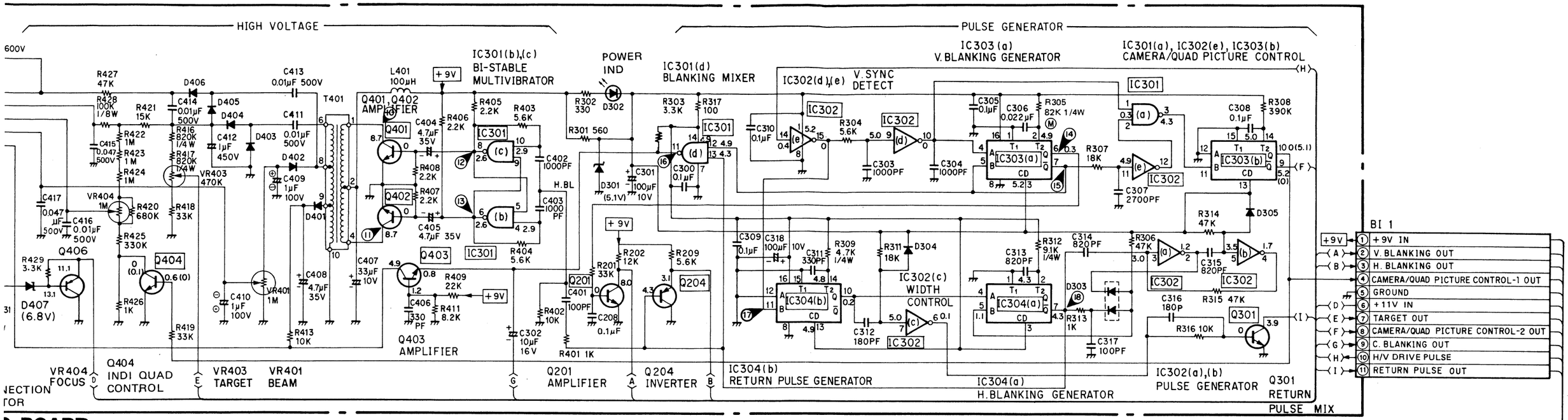
HIGH VOLTAGE BOARD



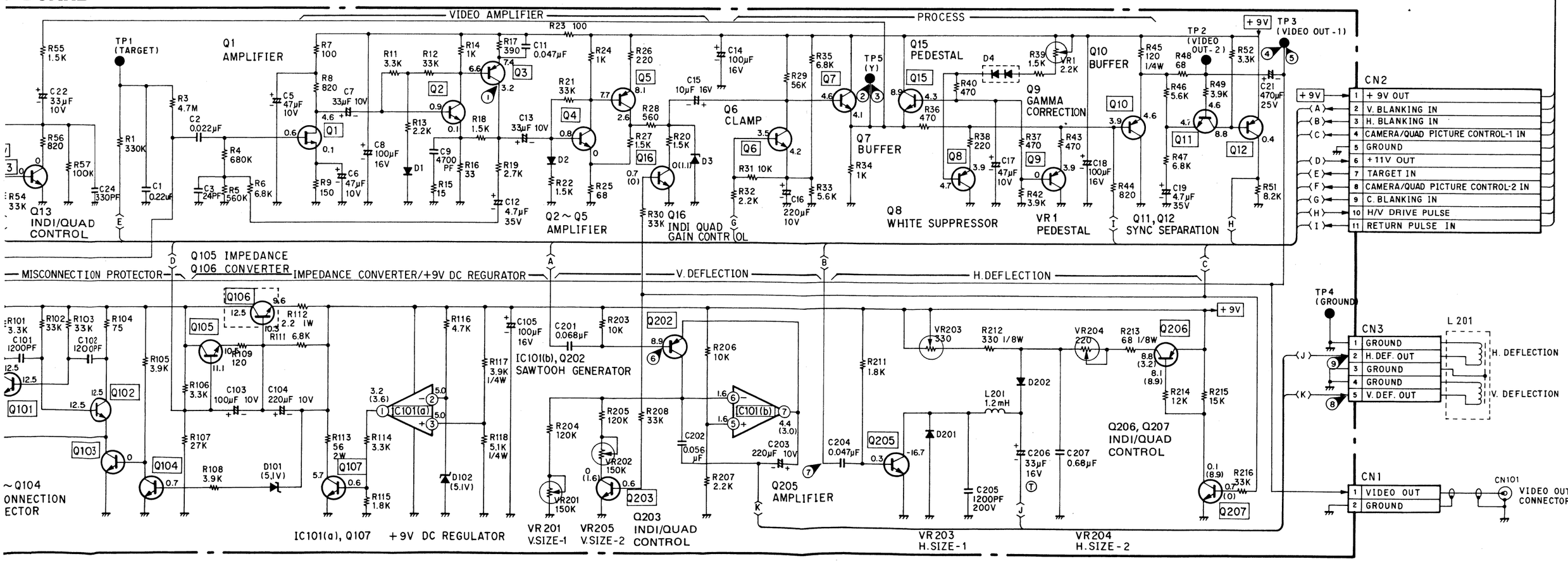
VIDEO BOARD

SCHEMATIC DIAGRAM OF WV-046

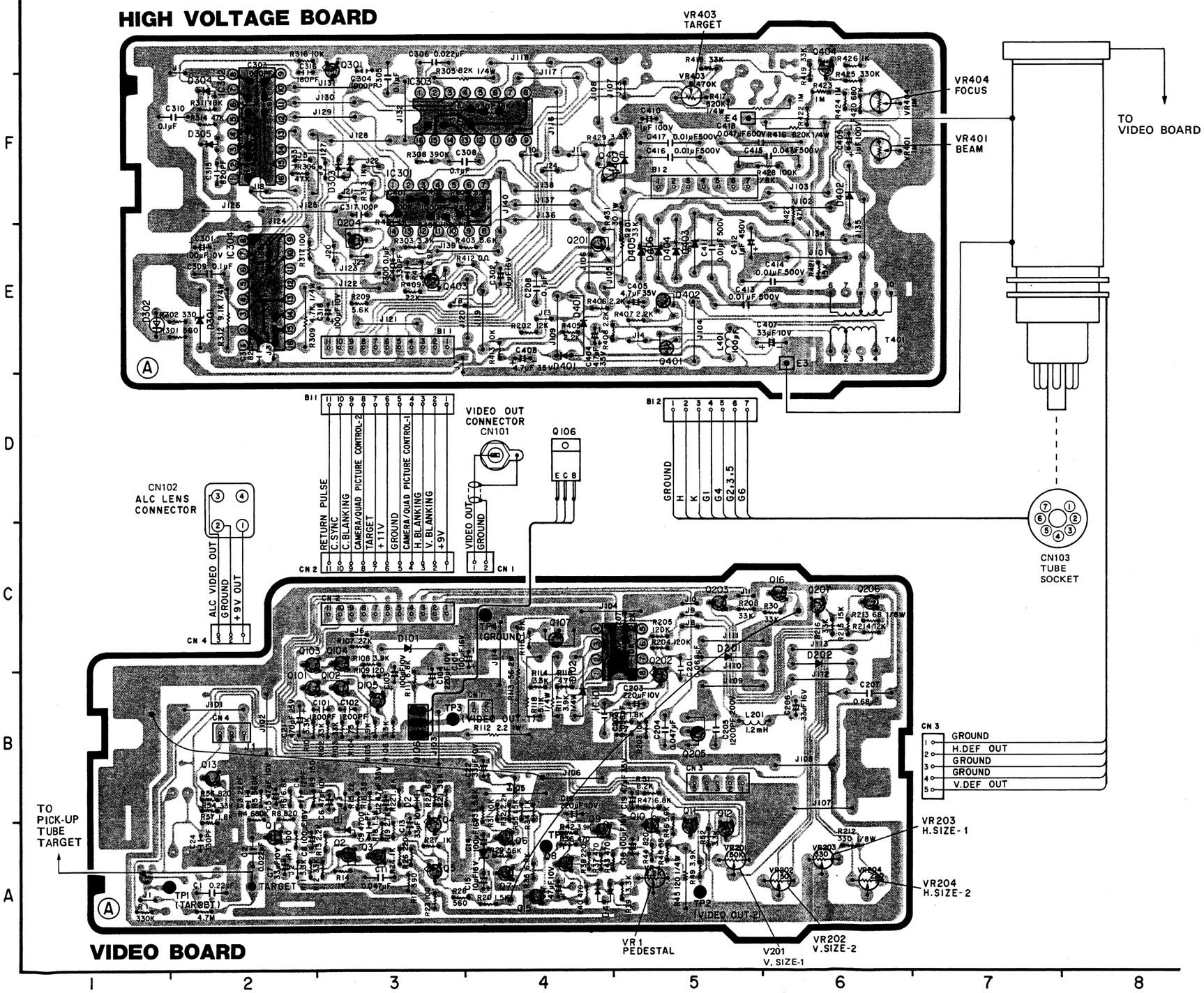
VOLTAGE BOARD



O BOARD



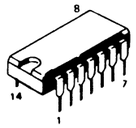
CONDUCTOR VIEW OF WV-046



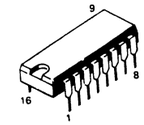
Video Board

IC101	NJM3415D	C4, 5	D3	RD5.1JB2		
Q1	2SK321-Q	(1F) A2	D4	MA153	(MC)	A4
Q2	2SC2404-CD	(U) A3	D101	RD5.1JT1B2		C3
Q3	2SA1022-C	(E) A3	D102	RD5.1JT1B2		B4
Q4	2SC2404-CD	(U) A3	D201	EU01Z		C5
Q5	2SA1022-C	(E) A3	D202	EU01Z		C6
Q6	2SC2404-CD	(U) A4				
Q7	2SD601-QR	(Y) A4	**High Voltage Board**			
Q8	2SB709-Q	(A) A4	IC301	HD74LS00P		F3
Q9	2SB709-Q	(A) A4	IC302	YWMSM4049		F2
Q10	2SB709-Q	(A) A5	IC303	HD74HC4538BP		F3, 4
Q11	2SD601-QR	(Y) A5	IC304	HD74HC4538BP		E2
Q12	2SB709-Q	(A) A5	Q201	2SD601-QR	(Y)	E4
Q13	2SD601-QR	(Y) B2	Q204	2SB710-QRS	(C)	C3
Q15	2SD601-QR	(Y) A4	Q301	2SD601-QR	(Y)	F3
Q16	2SD601-QR	(Y) C6	Q401	2SD602-Q	(W)	E5
Q101	2SD601-QR	(Y) B2	Q402	2SD602-Q	(W)	E5
Q102	2SD602-Q	(W) B3	Q403	2SD601A-QR	(Z)	E3
Q103	2SD602-Q	(W) C2	Q404	2SD601-QR	(Y)	F6,G6
Q104	2SD601-QR	(Y) C3	D301	RD5.1JT1B2		E2
Q105	2SD601-QR	(Y) B3	D302	LN23L		E1
Q106	2SC1398-QR		D303	MA151WA	(MN)	F3
Q107	2SC2590-QR	C4	D304	MA151K	(MH)	F2
Q202	2SB709-Q	(A) B5	D305	MA151K	(MH)	F2
Q203	2SD601-QR	(Y) C5	D401	EM01Z		E4
Q205	2SC2590-QR	B5	D402	EU01AV0		F6
Q206	2SB709-Q	(A) C6	D403	EU01AV0		E5
Q207	2SD601-QR	(Y) C6	D404	EU01AV0		E5
D1	MA151K	(MH) A3	D405	EU01AV0		E5
D2	MA151K	(MH) B3	D406	EU01AV0		E5

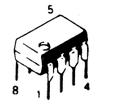
HD74LS00P



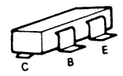
YWMSM4049
HD74HC4538BP



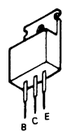
NJM3415D



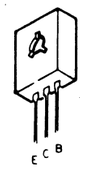
2SA1022-C
2SC2404-CD
2SB709-Q
2SB710-QRS
2SD601-QR
2SD601A-QR
2SD602-Q



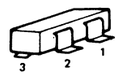
2SC1398-QR



2SC2590-QR

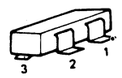


MA151WA



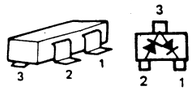
1 : Anode
2 : Anode
3 : Cathode

MA151K

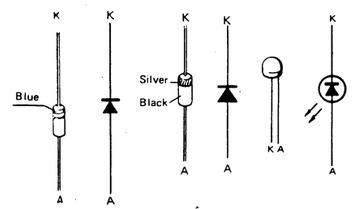


1 : NC
2 : Anode
3 : Cathode

MA153



RD5,1JB2
RD5,1JT1B2
EU01AVO
EU01Z



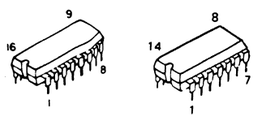
LN23L

CONDUCTOR VIEW OF PROCESS BOARD (WJ-400)

Process Board

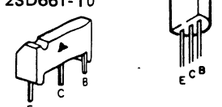
IC101	HD14046BP	A2, A3
IC102	MN4069UB	A3
IC103	MN4011B	A3
IC201	HD14046BP	C2, 3
IC202	MN4069UB	C3
IC203	MN4011B	C3
IC301	HD14046BP	B2, 3
IC302	MN4069UB	B3
IC401	HD14046BP	C2, 3
IC402	MN4069UB	C3
IC501	HD14049BCP	D4
IC502	YFMN74HC4066	D5
IC503	YFMN74HC4066	D5
Q101	2SA1254-BC	A4
Q102	2SB641-QR	A4
Q103	2SD636-Q	A4
Q104	2SA1254-BC	A5
Q106	2SC2377CD	A5
Q107	2SD661-TU	A5
Q108	2SD661-TU	A5
Q201	2SA1254-BC	B4
Q202	2SB641-QR	B4
Q203	2SD636-Q	B4
Q204	2SA1254-BC	C5
Q206	2SC2377CD	B5
Q207	2SD661-TU	B5
Q208	2SD661-TU	B5
Q301	2SA1254-BC	B4
Q302	2SB641-QR	B3
Q303	2SD636-Q	B4
Q304	2SA1254-BC	B5
Q306	2SC2377-CD	B5
Q307	2SD661-TU	B5
Q308	2SD661-TU	B5
Q401	2SA1254-BC	C4
Q402	2SB641-QR	C4
Q403	2SD636-Q	C4
Q404	2SA1254-BC	C5
Q406	2SC2377CD	C5
Q407	2SD661-TU	C5
Q408	2SD661-TU	C5
Q501	2SC2377CD	D3
Q502	2SC2377CD	D4
Q503	2SD661-TU	D3
Q504	2SC2377CD	D3
Q505	2SC2377CD	D3
Q506	2SD636-Q	D3
Q508	2SB641-QR	D4

HD14046BP　MN4069UB
HD14049BCP　MN4011B
YFMN74HC4066



2SA1254-BC
2SB641-QR
2SC2377-CD
2SD636-Q
2SD661-TU

2SC2377CD



CN105 VIDEO OUTPUT CONNECTOR CN105

VIDEO OUT

TO SYNC BOARD ·····BI6(CN6A) CN6B
C.SYNC IN
CHARACTOR IN
POSITION PULSE-4 IN
POSITION PULSE-3 IN
POSITION PULSE-2 IN
POSITION PULSE-1 IN
NOT USED

TO POWER BOARD ·····CN1A CN1D
GROUND
NOT USED
+9V IN
NOT USED

TO CAMERA POWER BOARD ·····BI12(CN12A) CN12B
CAMERA-4 IN
INHIBIT-4 IN

TO SYNC BOARD ·····BI7(CN7A) 2, 5, 6, 8, 9 CN8B
QUAD PICTURE HD-2 IN
VD-4 IN
GROUND
GROUND
VD-2 IN

TO CAMERA POWER BOARD ·····BI10(CN10A) CN10B
CAMERA-2 IN
INHIBIT-2 IN

TO CAMERA POWER BOARD ·····BI11(CN11A) CN11B
CAMERA-3 IN
INHIBIT-3 IN

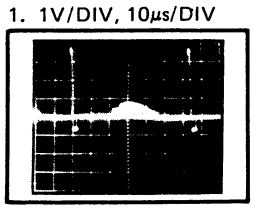
TO SYNC BOARD ·····BI7(CN7A) CN7B
QUAD PICTURE HD-1 IN
VD-3 IN
GROUND
GRORND
VD-1 IN

TO CAMERA POWER BOARD ·····BI9(CN9A) CN9B
CAMERA-1 IN
INHIBIT-1 IN

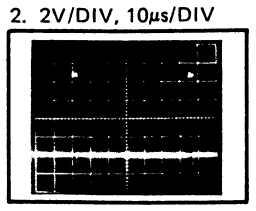
PROCESS BOARD

VR1 PEDESTAL

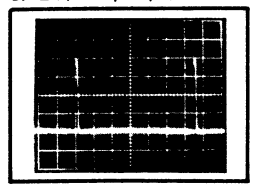
1. 1V/DIV, 10μs/DIV



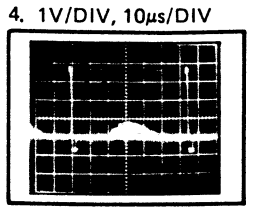
2. 2V/DIV, 10μs/DIV



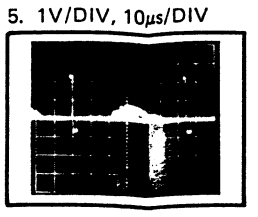
3. 2V/DIV, 10μs/DIV



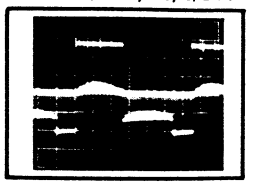
4. 1V/DIV, 10μs/DIV



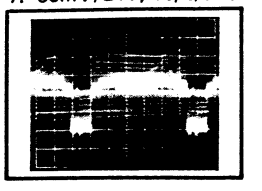
5. 1V/DIV, 10μs/DIV



6. 50mV/DIV, 10μs/DIV

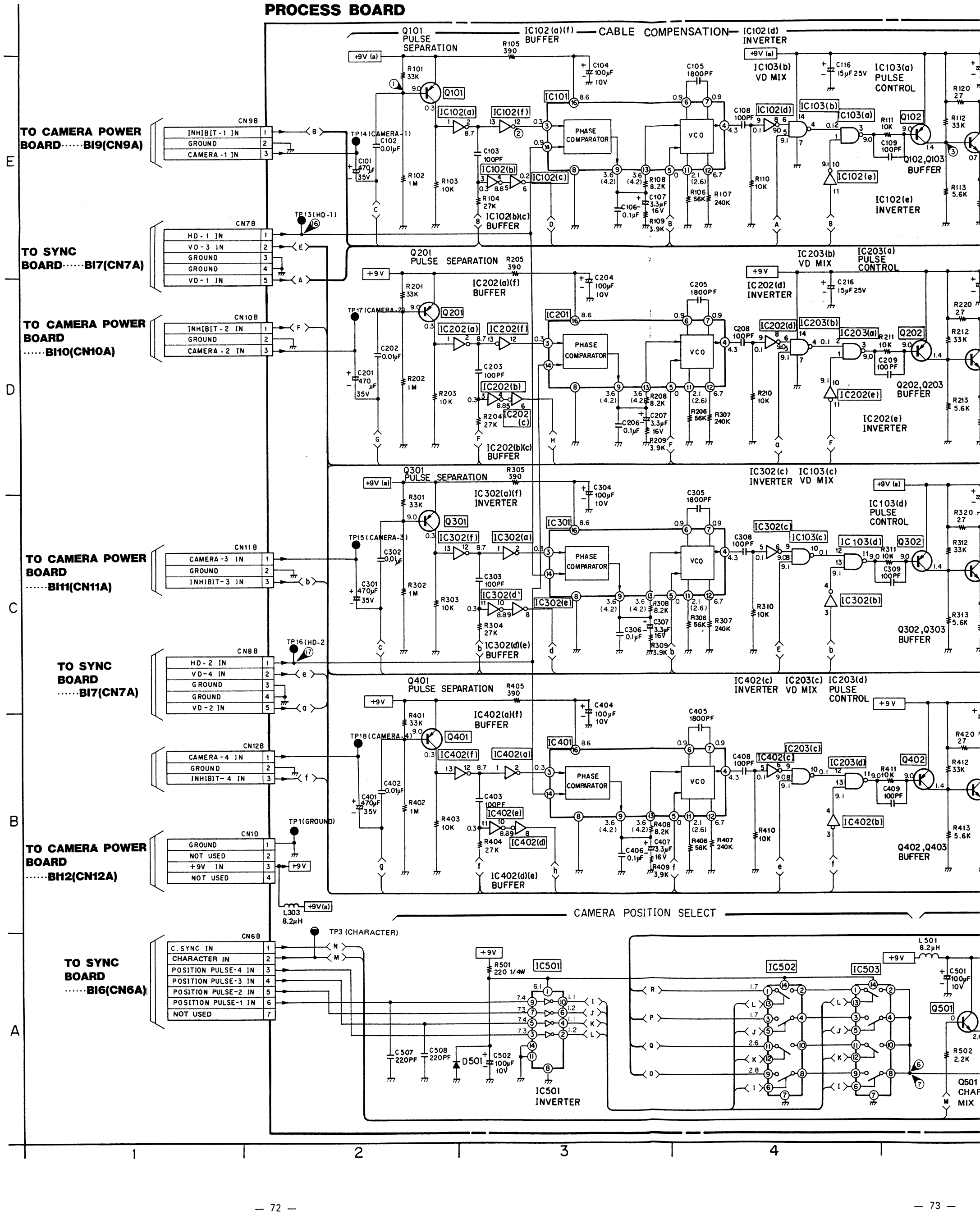


7. 50mV/DIV, 10μs/DIV

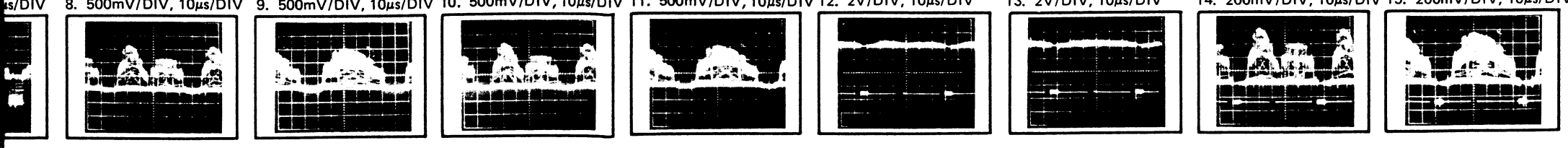


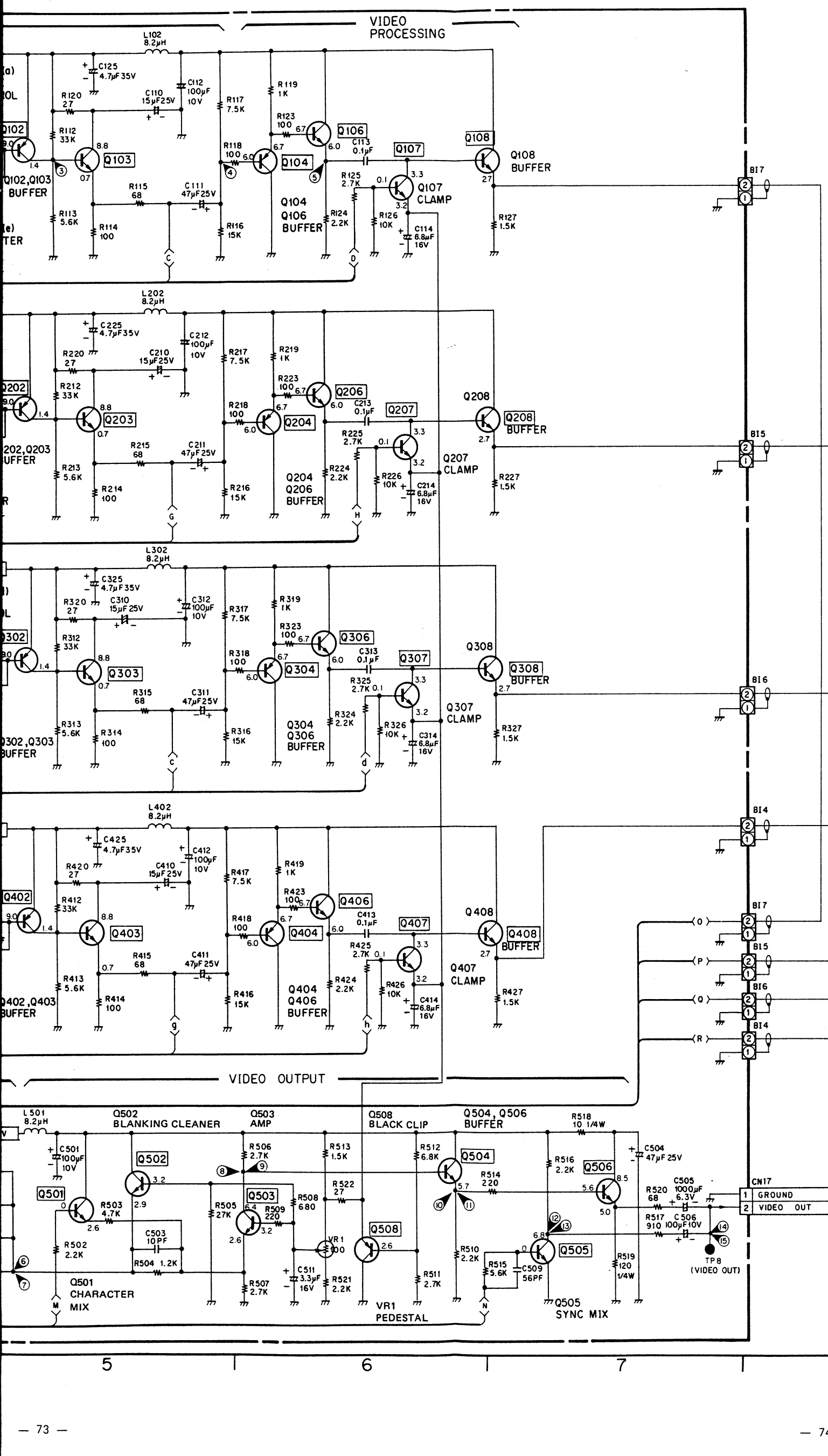
8. 500m

PROCESS BOARD



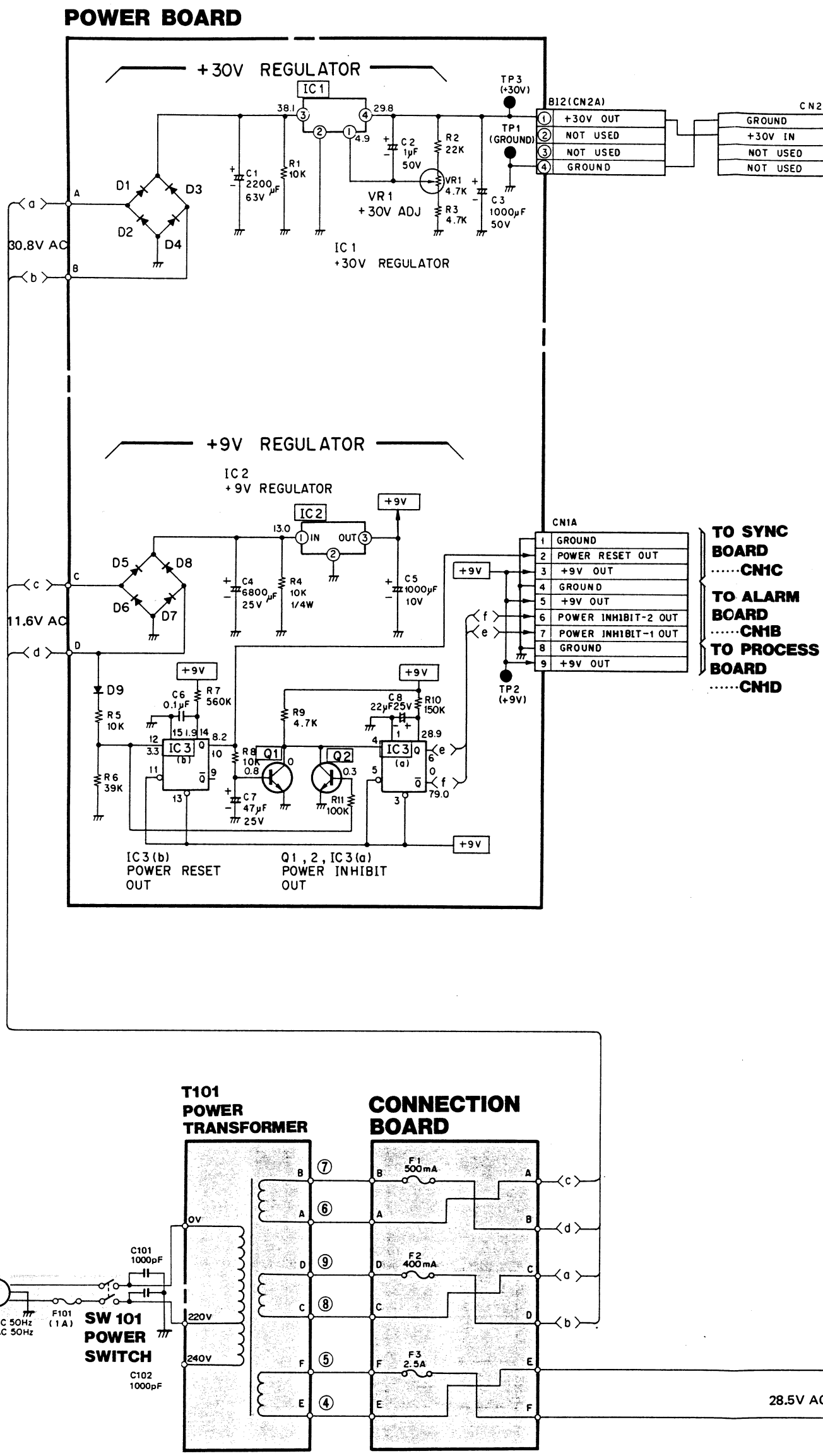
OF PROCESS BOARD (WJ-400)





IC101	HD14046BP	E3
IC102	MN4069UB	E3, E4
IC103	MN4011B	C4, E4
IC201	HD14046BP	D3
IC202	MN4069UB	D3, D4
IC203	MN4011B	B4, D4
IC301	HD14046BP	C3
IC302	MN4069UB	C3, C4
IC401	HD14046BP	B3
IC402	MN4069UB	B3, B4
IC501	HD14049BCP	A3
IC502	YFMN74HC4066	A4
IC503	YFMN74HC4066	A4
Q101	2SA1254-BC	E2
Q102	2SB641-QR	E5
Q103	2SD636-Q	E5
Q104	2SA1254-BC	E6
Q106	2SC2377CD	E6
Q107	2SD661-TU	E6
Q108	2SD661-TU	E7
Q201	2SA1254-BC	D2
Q202	2SB641-QR	D5
Q203	2SD636-Q	D5
Q204	2SA1254-BC	D6
Q206	2SC2377CD	D6
Q207	2SD661-TU	D6
Q208	2SD661-TU	D7
Q301	2SA1254-BC	C2
Q302	2SB641-QR	C5
Q303	2SD636-Q	C5
Q304	2SA1254-BC	C6
Q306	2SC2377-CD	C6
Q307	2SD661-TU	C6
Q308	2SD661-TU	C7
Q401	2SA1254-BC	B2
Q402	2SB641-QR	B5
Q403	2SD636-Q	B5
Q404	2SA1254-BC	B6
Q406	2SC2377CD	B6
Q407	2SD661-TU	B6
Q408	2SD661-TU	B7
Q501	2SC2377CD	A5
Q502	2SC2377CD	A5
Q503	2SD661-TU	A6
Q504	2SC2377CD	A6
Q505	2SC2377CD	A7
Q506	2SD636-Q	A7
Q508	2SB641-QR	A6

SCHEMATIC DIAGRAM OF POWER BOARD, CA



PRODUCT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

Camera Power Board

IC101	YFBX7187-Z	E5, 6	Q102	2SB642-QRS	E4	Q203	2SD636-Q	D4	Q304	2SA748-QR	C7	Q405	2SD636-Q	A7	D106	MA165	E4
IC201	YFBX7187-Z	D5, 6	Q103	2SD636-Q	E4	Q204	2SA748-QR	D7	Q305	2SD636-Q	B7	Q406	2SD636-Q	A7	D107	YFHZ6LC2	E4
IC301	YFBX7187-Z	B5, 6, C5, 6	Q104	2SA748-QR	E7	Q205	2SD636-Q	D7	Q306	2SD636-Q	B7	D101	EM01Z	E4	D108	MA4270-HTA	E7
IC401	YFBX7187-Z	A5, 6	Q105	2SD636-Q	E7	Q206	2SD636-Q	D7	Q401	YW2SD843-0Y	B4	D102	EM01Z	E4	D201	EM01Z	D4
IC501	AN78L09	A4	Q106	2SD636-Q	E7	Q301	YW2SD843-0Y	C4	Q402	2SB642-QRS	B4	D103	EM01Z	E4	D202	EM01Z	D4
Q101	YW2SD843-0Y	E4	Q201	YW2SD843-0Y	D4	Q302	2SB642-QRS	C4	Q403	2SD636-Q	A4	D104	EM01Z	E4	D203	EM01Z	D4
			Q202	2SB642-QRS	D4	Q303	2SD636-Q	C4	Q404	2SA748-QR	A7	D105	1SR124100A	E4	D204	EM01Z	D4

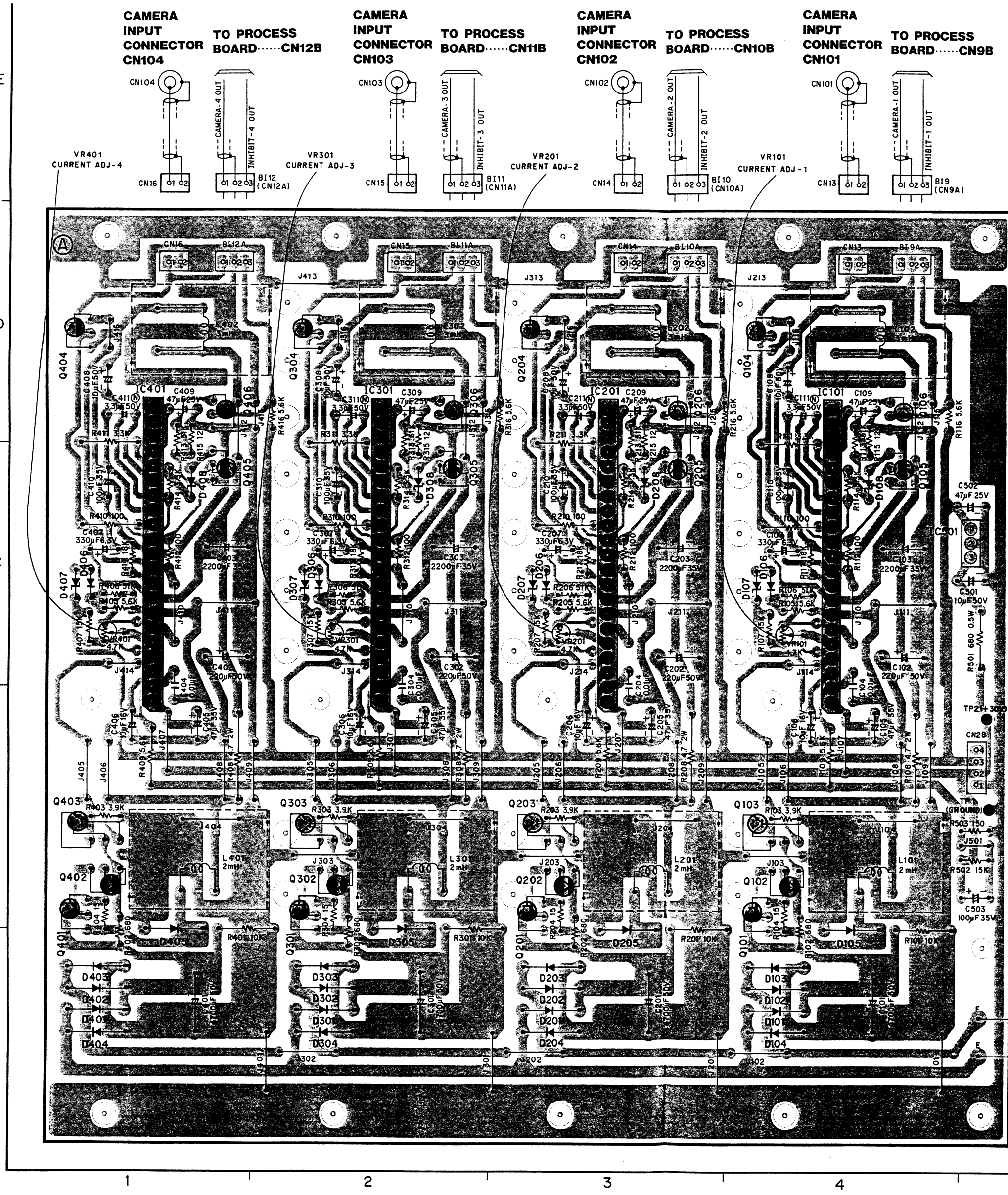
BOARD, CAMERA POWER BOARD, CONNECTION BOARD (WJ-400)

6	MA165	E4	D205	1SR124100A	D4	D304	EM01Z	C4	D403	EM01Z	A4
7	YFHZ6LC2	E4	D206	MA165	D4	D305	1SR124100A	C4	D404	EM01Z	A4
8	MA4270-HTA	E7	D207	YFHZ6LC2	D4	D306	MA165	C4	D405	1SR124100A	A4
1	EM01Z	D4	D208	MA4270-HTA	D7	D307	YFHZ6LC2	C4	D406	MA165	A4
2	EM01Z	D4	D301	EM01Z	C4	D308	MA4270-HTA	B7	D407	YFHZ6LC2	A4
3	EM01Z	D4	D302	EM01Z	C4	D401	EM01Z	A4	D408	MA4270-HTA	A7
4	EM01Z	D4	D303	EM01Z	C4	D402	EM01Z	A4			

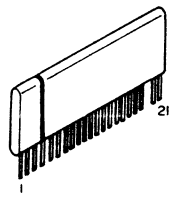
Power Board

IC1	AN6531	F2	D3	EM01Z	E1
IC2	AN78N09	D2	D4	EM01Z	E1
IC3	YWHD14538BP	C1, 2	D5	EM01Z	D1
Q1	2SC2377CD	C1	D6	EM01Z	D1
Q2	2SC2377CD	C2	D7	EM01Z	D1
D1	EM01Z	E1	D8	EM01Z	D1
D2	EM01Z	E1	D9	EM01Z	D1

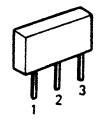
CONDUCTOR VIEW OF POWER BOARD, C



YFBX7187A



AN78N09
AN78L09

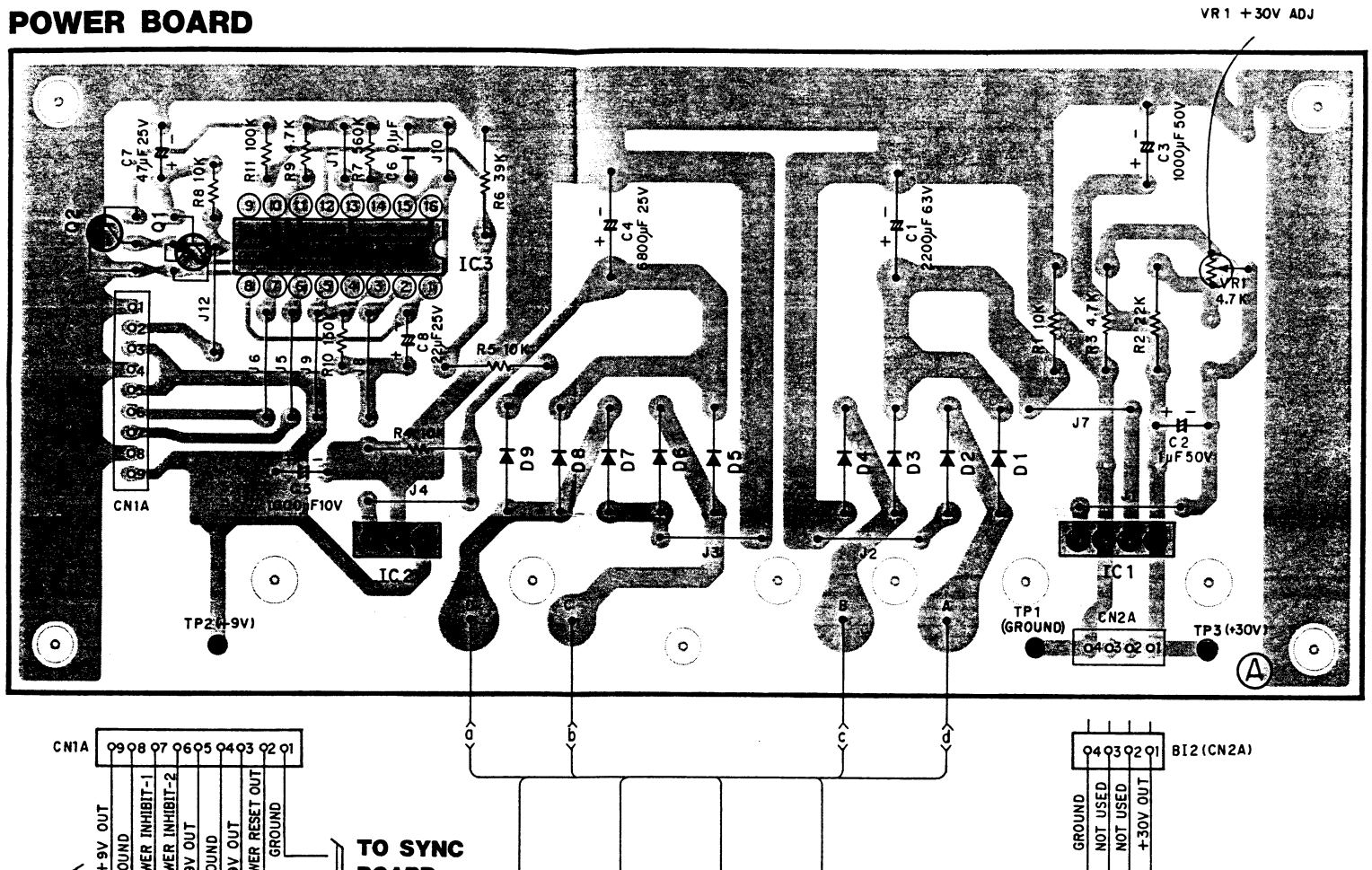


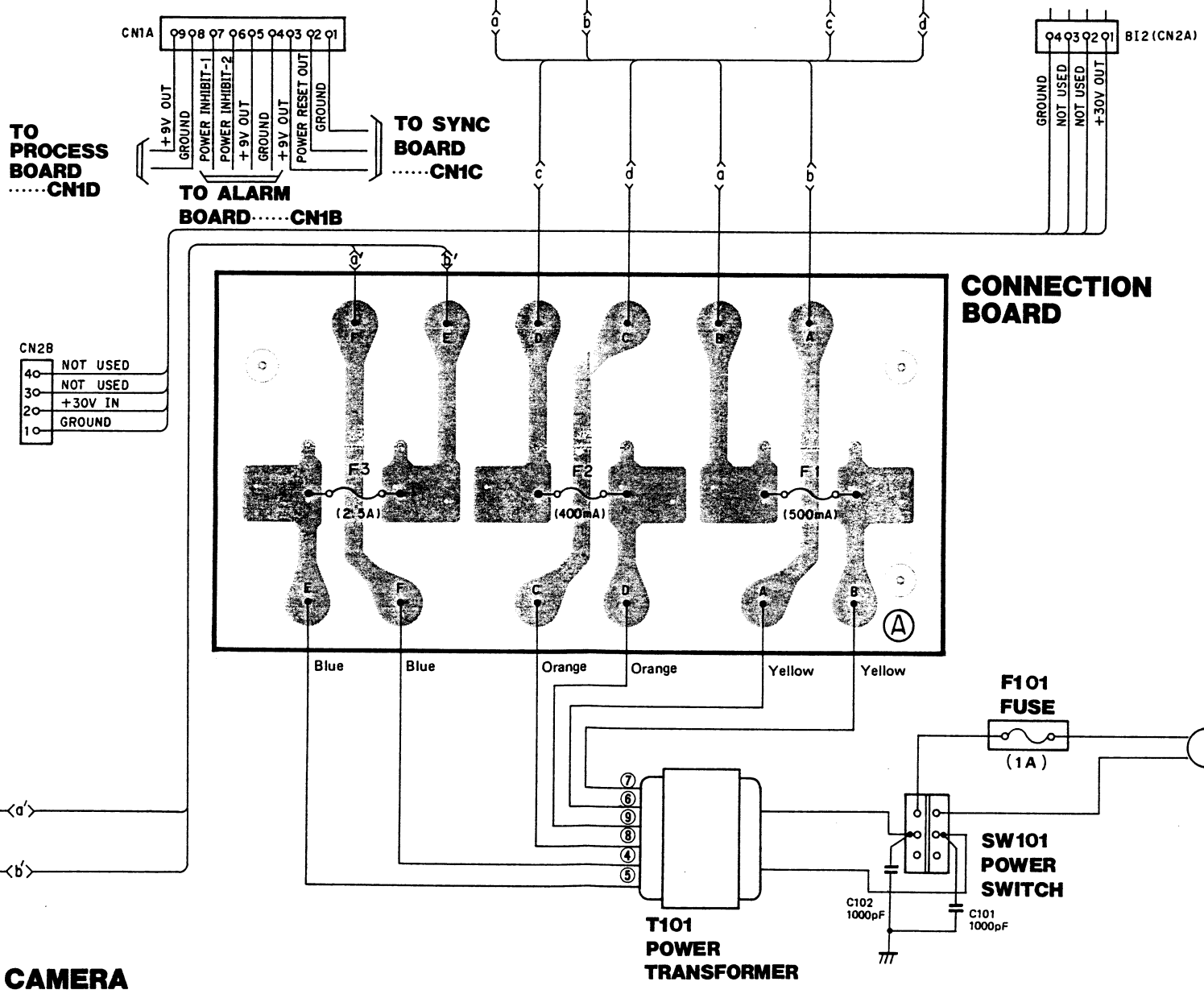
AN6

OARD, CAMERA POWER BOARD, CONNECTION BOARD (WJ-400)

SS
CN9B

POWER BOARD





CAMERA POWER BOARD

Camera Power Board

IC101	YFBX7187-Z	C4
IC201	YFBX7187-Z	C3
IC301	YFBX7187-Z	C2
IC401	YFBX7187-Z	C1
IC501	AN78L09	C5
Q101	YW2SD843-0Y	B4
Q102	2SB642-QRS	B4
Q103	2SD636-Q	B4
Q104	2SA748-QR	D4
Q105	2SD636-Q	C4
Q106	2SD636-Q	D4
Q201	YW2SD843-0Y	B3
Q202	2SB642-QRS	B3
Q203	2SD636-Q	B3
Q204	2SA748-QR	D3
Q205	2SD636-Q	C3
Q206	2SD636-Q	D3
Q301	YW2SD843-0Y	B2
Q302	2SB642-QRS	B2
Q303	2SD636-Q	B2
Q304	2SA748-QR	D2
Q305	2SD636-Q	C2
Q306	2SD636-Q	D2
Q401	YW2SD843-0Y	B1
Q402	2SB642-QRS	B1
Q403	2SD636-Q	B1
Q404	2SA748-QR	D1
Q405	2SD636-Q	C1
Q406	2SD636-Q	D1
D101	EM01Z	A4
D102	EM01Z	A4
D103	EM01Z	A4
D104	EM01Z	A4
D105	1SR124100A	A4
D106	MA165	C4
D107	YFHZ6LC2	C4
D108	MA4270-HTA	C4
D201	EM01Z	A3
D202	EM01Z	A3
D203	EM01Z	A3
D204	EM01Z	A3
D205	1SR124100A	A3
D206	MA165	C3
D207	YFHZ6LC2	C3
D208	MA4270-HTA	C3
D301	EM01Z	A2
D302	EM01Z	A2
D303	EM01Z	A2
D304	EM01Z	A2
D305	1SR124100A	A2
D306	MA165	C2
D307	YFHZ6LC2	C2
D308	MA4270-HTA	C2
D401	EM01Z	A1
D402	EM01Z	A1
D403	EM01Z	A1
D404	EM01Z	A1
D405	1SR124100A	A1
D406	MA165	C1
D407	YFHZ6LC2	C1
D408	MA4270-HTA	C1

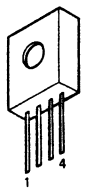
Power Board

IC1	AN6531	D8
IC2	AN78N09	D6
IC3	YWHD14538BP	D6
Q1	2SC2377CD	D5
Q2	2SC2377CD	D5
D1	EM01Z	D7
D2	EM01Z	D7
D3	EM01Z	D7
D4	EM01Z	D7
D5	EM01Z	D7
D6	EM01Z	D7
D7	EM01Z	D6
D8	EM01Z	D6
D9	EM01Z	D6

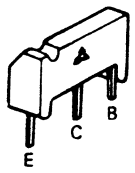
5 6 7 8

AN78N09
AN78L09

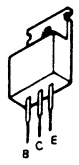
AN6531



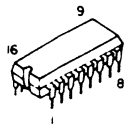
2SB642-QRS
2SD636-Q



2SA748-QR
YW2SD843-OY

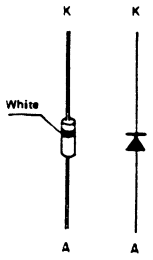


YWHD14538BP

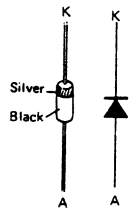


2SC2377CD

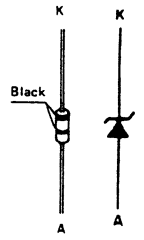
MA165



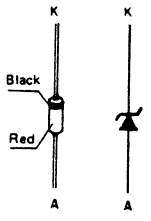
EM01Z



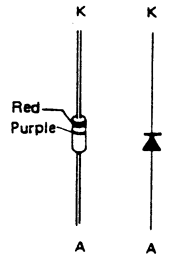
1SR124100A



YFHZ6LC2



MA4270-HTA



SCHEMATIC DIAGRAM OF ALARM BOARD, SWITCH BOARD, AUTO

Alarm Board

IC1	MN40175B	D6, 7
IC2	HD14071BP	C6, 7
IC3	HD14072BP	B5
IC4	HD14081BP	C6
IC5	MN4069UB	C6, 7
IC6	MN4069UB	B5, C5, D5
IC7	HD14081BP	C5, D5
IC8	MN4011B	B5, C5
IC9	YWHD14013BP	B4
IC10	MN4011B	B4, C4
IC11	YWHD14013BP	D5
IC12	YWHD14538BP	B3, 4
IC13	YWHD14538BP	B3, C3, 4
Q1	2SD973A-RS	C4
Q2	2SD636-Q	C4
Q3	2SD636-Q	D3
Q4	2SD636-Q	C3
Q5	2SD636-Q	C3
Q6	2SD636-Q	C3
Q7	2SD636-Q	C3
Q8	2SC2377CD	A3
Q9	2SA1254-BC	A3
Q10	2SC2377CD	A3
Q11	2SB641-QR	A4
Q12	2SC2377CD	A5
Q13	2SC2377CD	A6
Q14	2SC2377CD	A6
Q15	2SC2377CD	A7
D1	MA150	A3
D2	MA150	A3
D3	MA150	A4
D4	MA4039H	A5
D5	MA4039H	A5
D6	MA4039H	A6
D7	MA4039H	A7
D8	MA150	C3

Switch Board

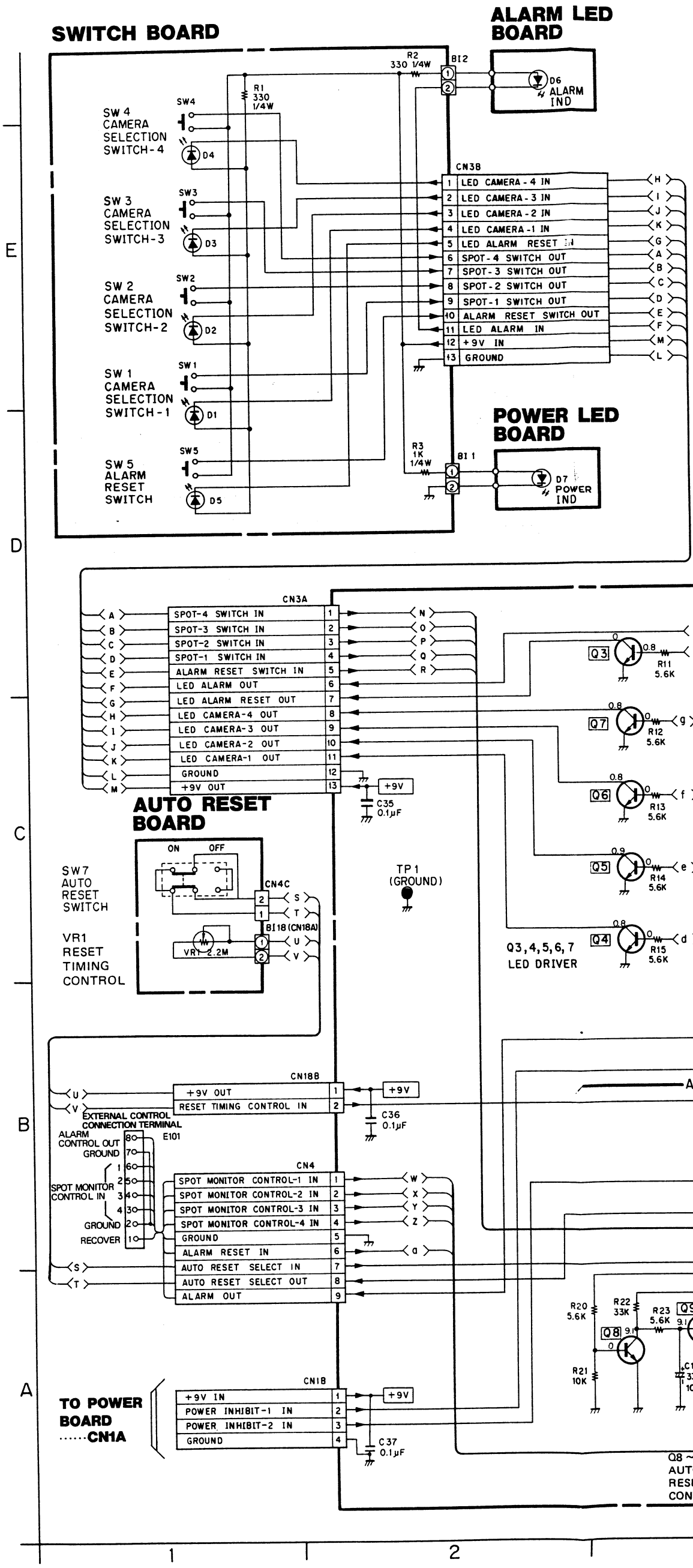
D1	LN39GP	D1
D2	LN39GP	E1
D3	LN39GP	E1
D4	LN39GP	E1
D5	LN39GP	D1

Alarm LED Board

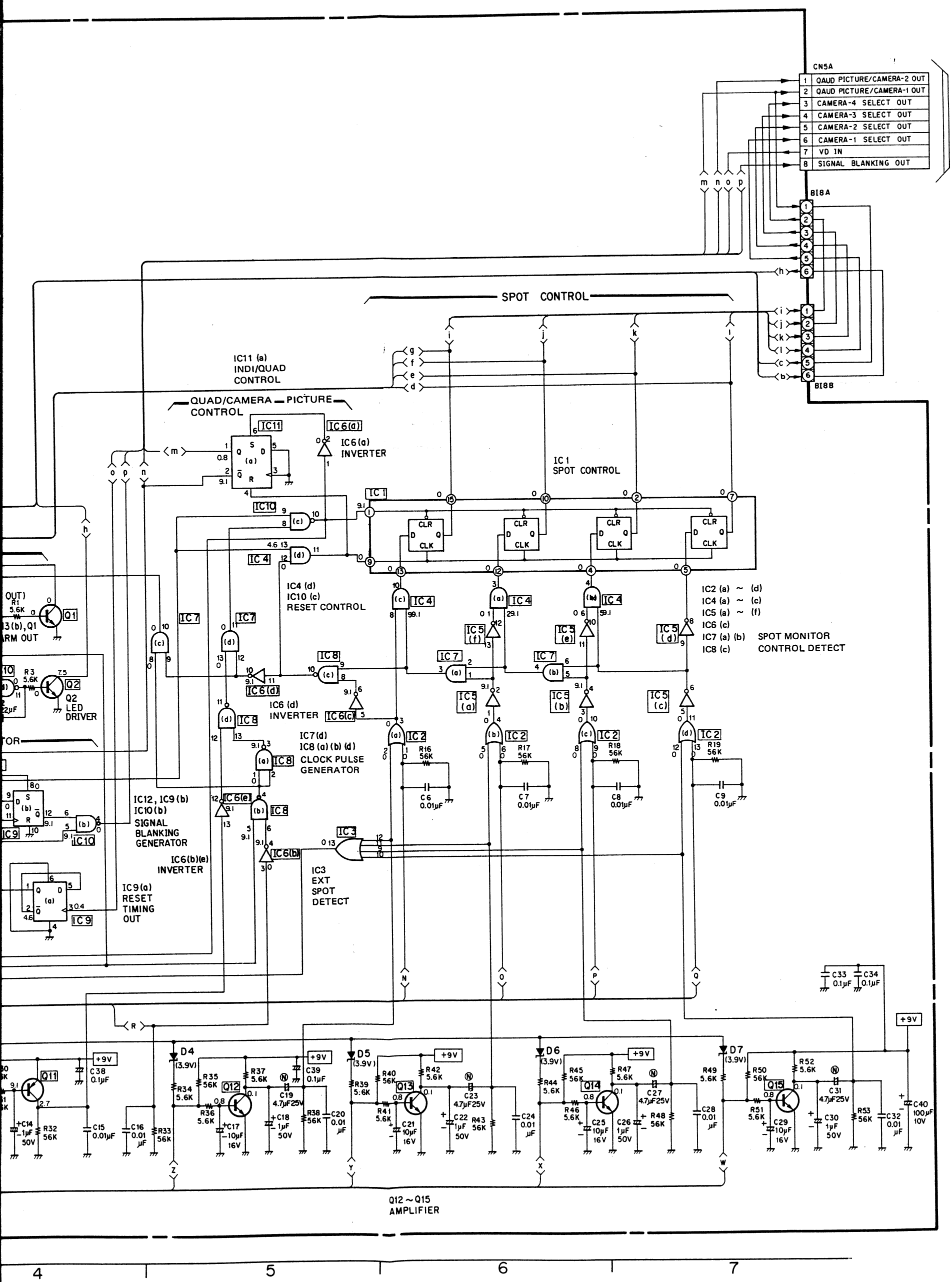
D6	LN21RPHL	F2

Power LED Board

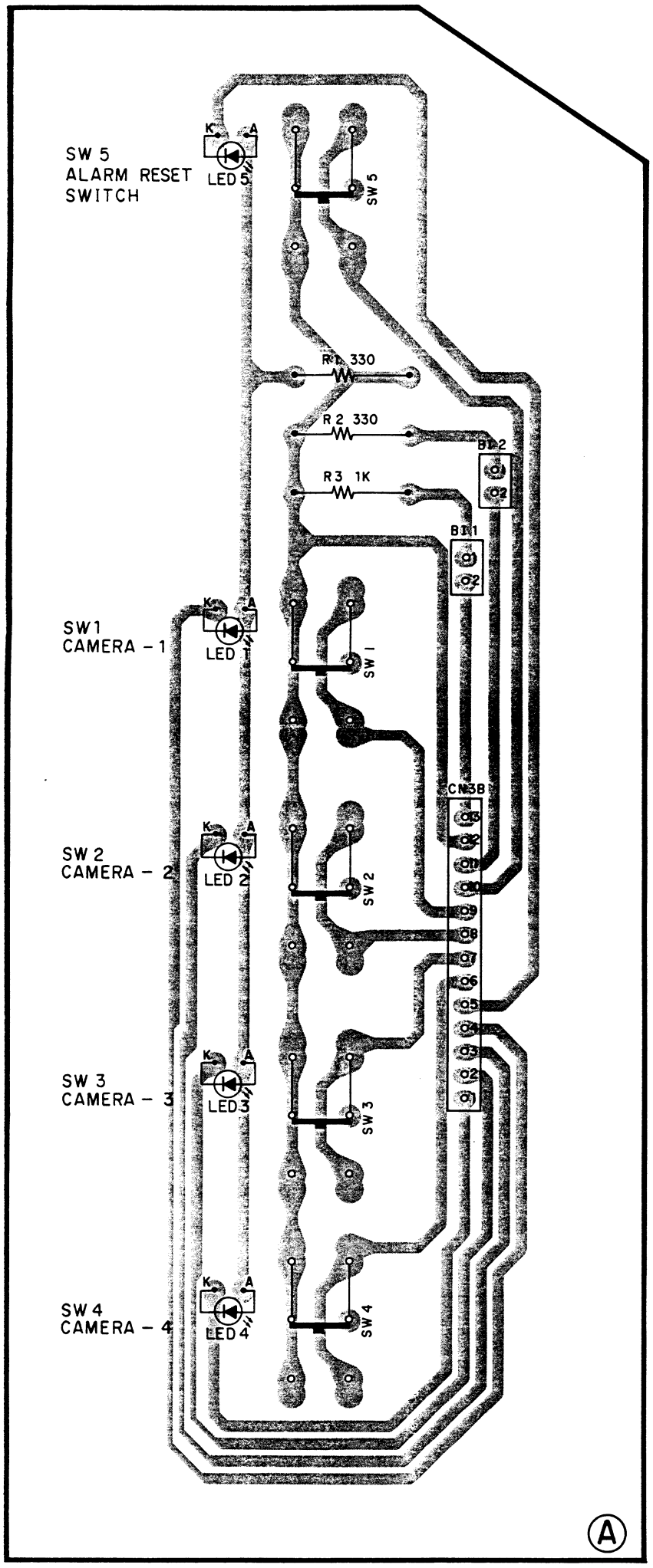
D7	LN21RPHL	



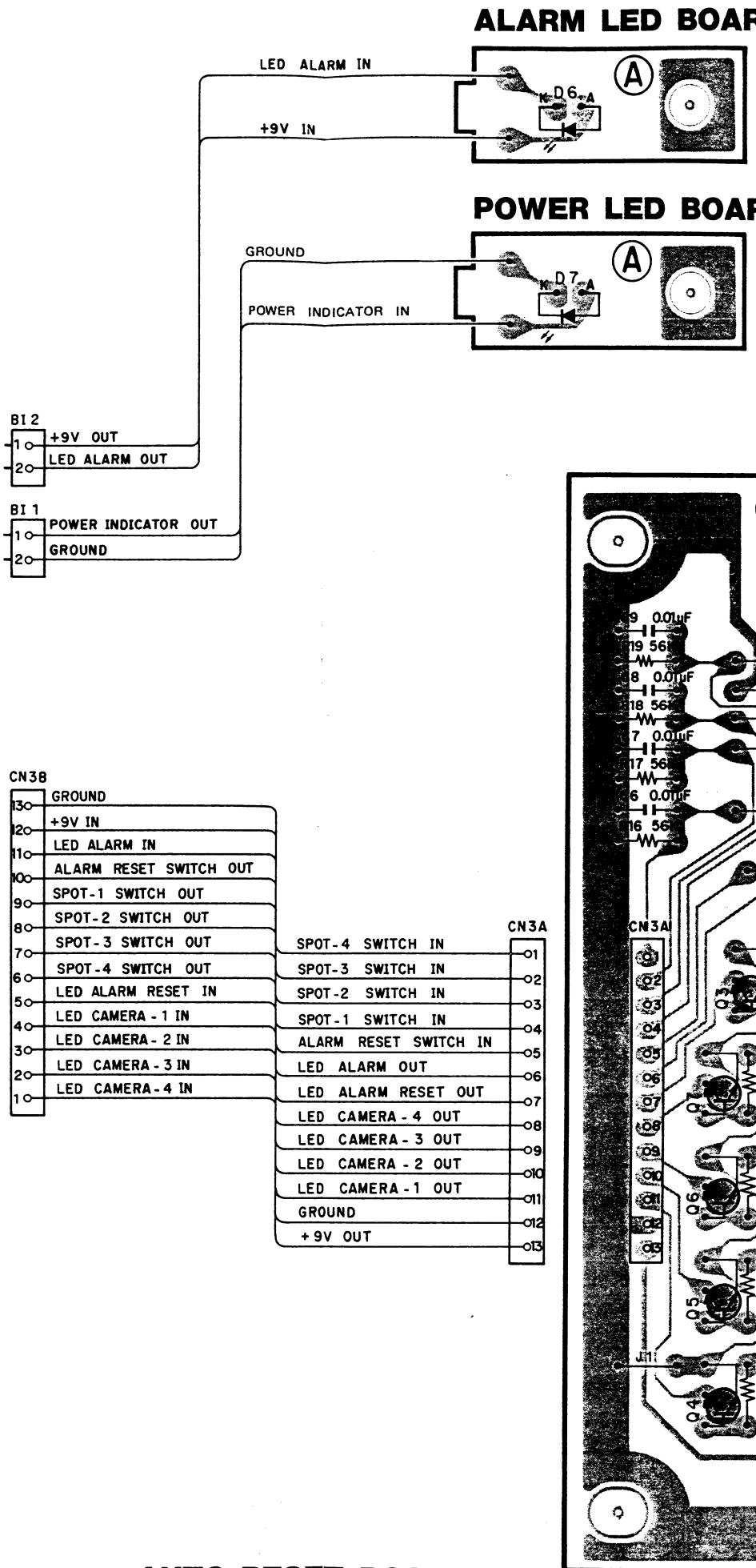
TO RESET BOARD, ALARM LED BOARD, POWER LED BOARD (WJ-400)



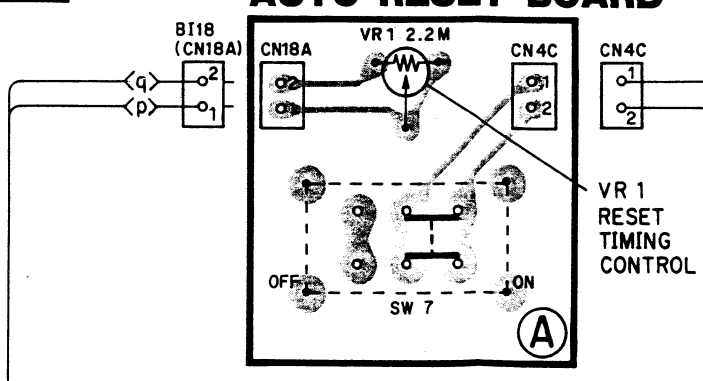
CONDUCTOR VIEW OF ALARM BOARD, SWITCH BOARD, AUTO RESE

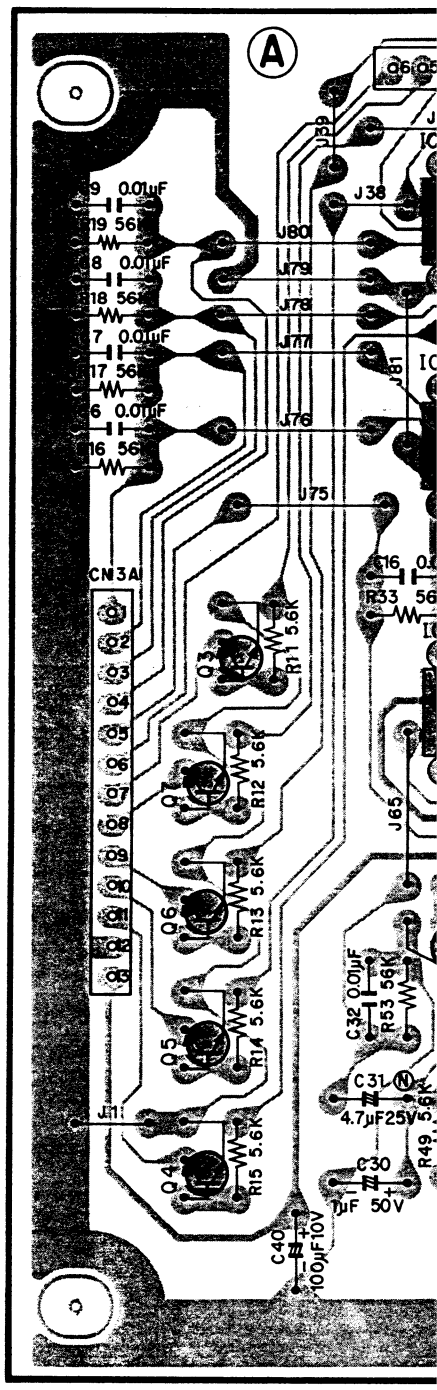


SWITCH BOARD



AUTO RESET BOARD





ALARM BOARD

Alarm Board								
IC1	MN40175B	D5	IC13	YWHD14538BP	B8	Q12	2SC2377CD	B6
IC2	HD14071BP	C5	Q1	2SD973A-RS	B7	Q13	2SC2377CD	B5
IC3	HD14072BP	C5	Q2	2SD636-Q	D8	Q14	2SC2377CD	B5
IC4	HD14081BP	D5, 6	Q3	2SD636-Q	C4	Q15	2SC2377CD	B4
IC5	MN4069UB	C5, 6	Q4	2SD636-Q	B4	D1	MA150	B6
IC6	MN4069UB	C5, 6	Q5	2SD636-Q	B4	D2	MA150	B7
IC7	HD14081BP	D6	Q6	2SD636-Q	B4	D3	MA150	B6
IC8	MN4011B	C6	Q7	2SD636-Q	B4	D4	MA4039H	B6
IC9	YWHD14013BP	C6	Q8	2SC2377CD	B7	D5	MA4039H	B6
IC10	MN4011B	D7	Q9	2SA1254-BC	B7	D6	MA4039H	B5
IC11	YWHD14013BP	C7	Q10	2SC2377CD	B7	D7	MA4039H	B5
IC12	YWHD14538BP	C7	Q11	2SB641-QR	B6	D8	MA150	C7

Switch Board

D1	LN39GP	D1
D2	LN39GP	C2
D3	LN39GP	C3
D4	LN39GP	B1
D5	LN39GP	E1

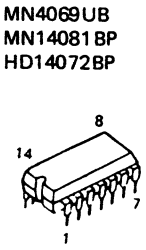
Alarm LED Board

D6	LN21RPHL	E4

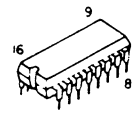
Power LED Board

D7	LN21RPHL	

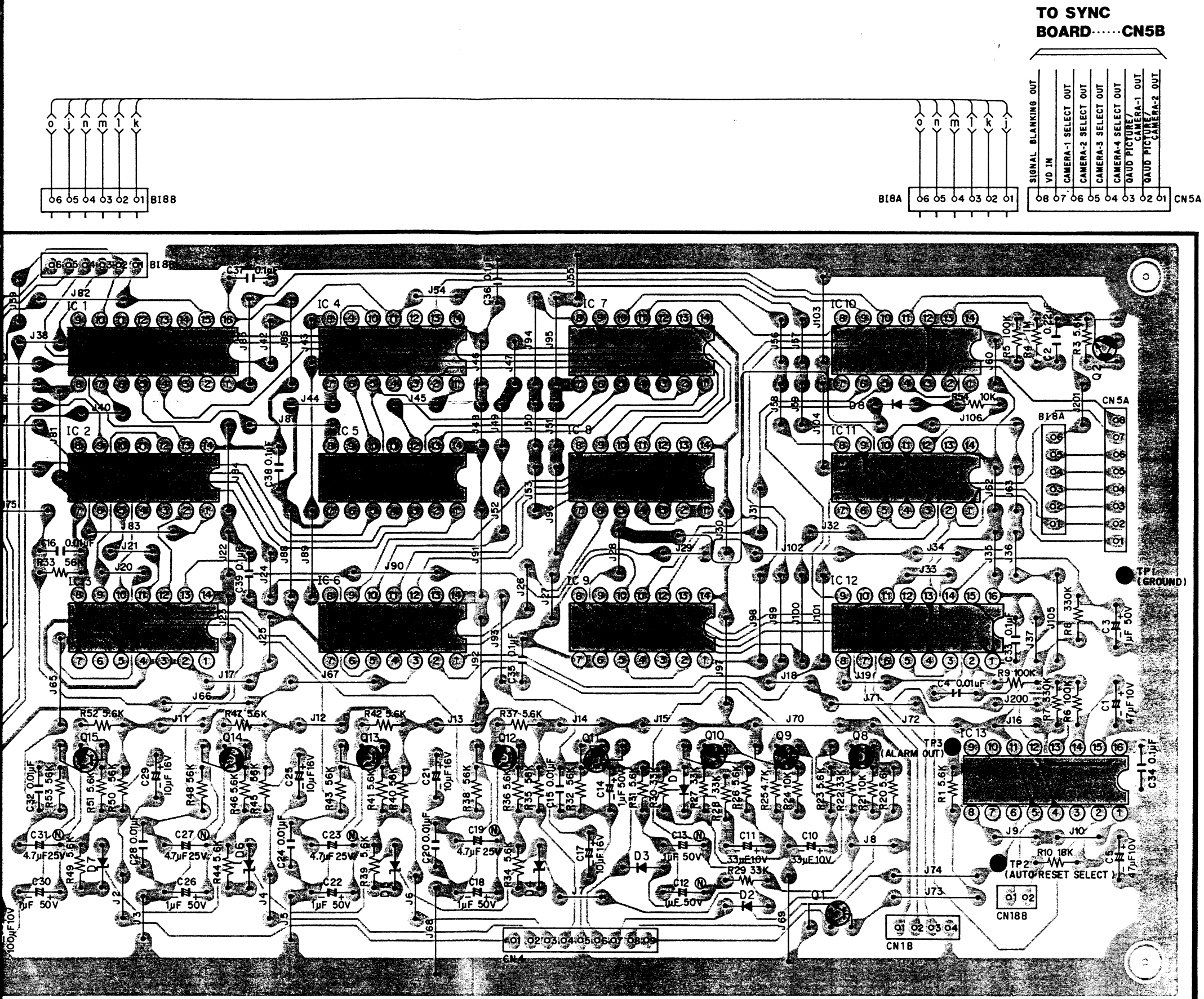
MN40175B
YWHD14538BP
MN4011B
YWHD14013BP
MN4069UB
MN14081BP
HD14072BP

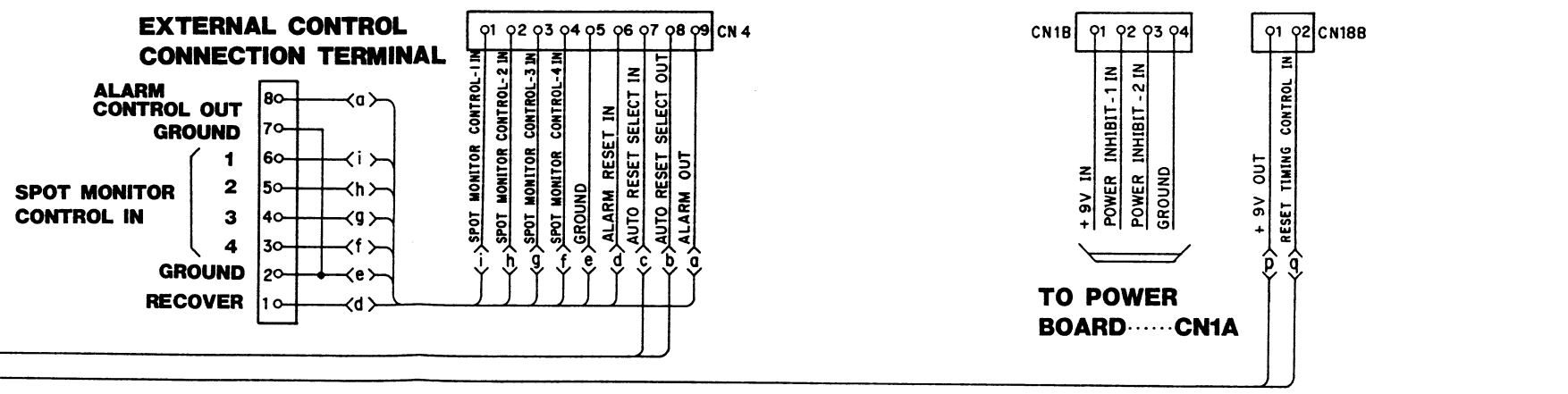


HD14071BP



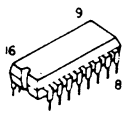
RESET BOARD, ALARM LED BOARD, POWER LED BOARD (WJ-400)



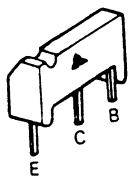


5 6 7 8

HD14071BP

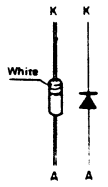


2SD636-Q
2SD973A-RS
2SA1254-BC
2SB641-QR

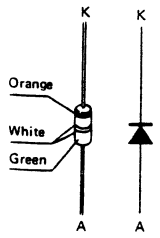


2SC2377CD

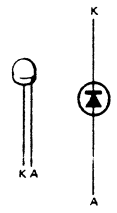
MA150



MA4039H



LN39GP
LN21RHL



SYNC BOARD

TO ALARM BOARD ·····CN5A

BI5 (CN5B)

CAMERA-1 SELECT IN	1	A
CAMERA-3 SELECT IN	2	B
CAMERA-2 SELECT IN	3	C
CAMERA-4 SELECT IN	4	D
SIGNAL BLANKING IN	5	E
QUAD PICTURE/CAMERA-1 IN	6	F
QUAD PICTURE/CAMERA-2 IN	7	G
VD OUT	8	H

TO POWER BOARD ·····CN1A

CN1C

POWER RESET IN	1
GROUND	2
+9V IN	3
NOT USED	4

TP1 (GROUND)

CLOCK PULSE GENERATOR

IC2

IC3 VOC

IC1 SYNC GENERATOR

SYNC GENERATOR

IC43 +5V REGULATOR

Q4,Q5 AMP

Q6 INVERTER

Q3,Q6 AMP

Q2 AMP

Q1 AMP

CT1 H-FREQ ADJ

TP2 (H.FREQ)

IC10 VERTICAL COUNTOR

VERTICAL COUNTER

BI16A(J6)

BI16B(J6)

IC4-1C7 SHIFT RESISTER

IC42(a) INVERTER

IC42 INVERTER

IC34 (a)(b) SELECT MIX

IC18(a)(b) INVERTER

IC14(b) HD MIX

IC37(a) INVERTER

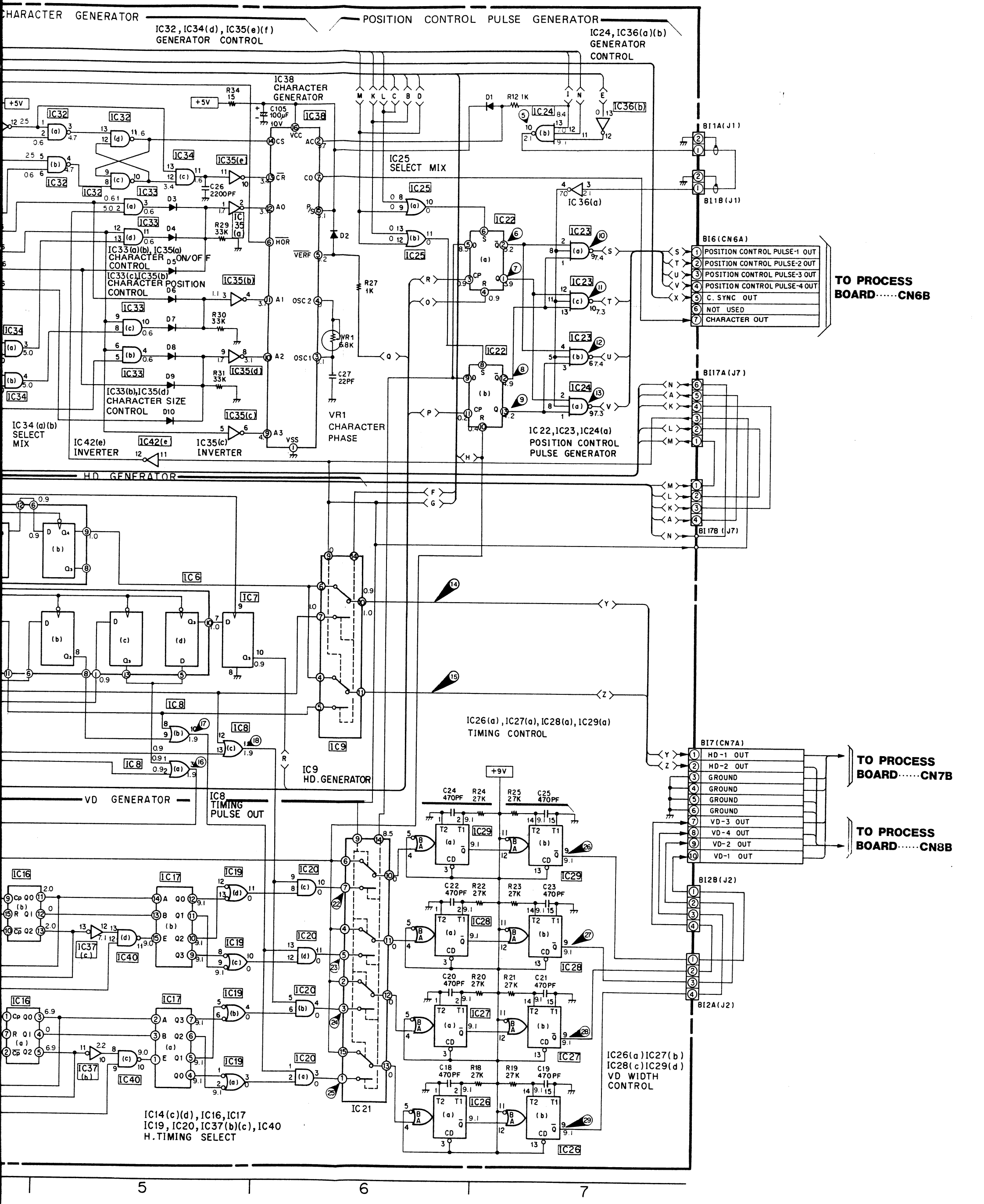
IC12(b)(c)(d) IC13(a)(b) PULSE GENERATOR

IC12(a) PULSE GENERATOR

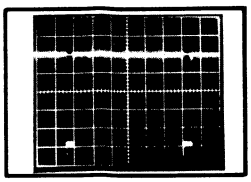
IC13(c)(d) IC14(a) PULSE GENERATOR

IC15 V.TIMING SELECT

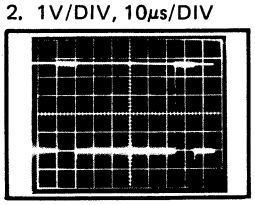
M OF SYNC BOARD (WJ-400)



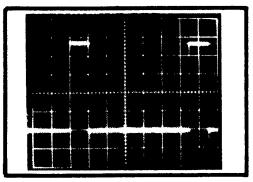
1. 1V/DIV, 10μs/DIV



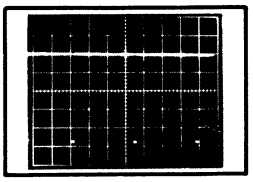
2. 1V/DIV, 10μs/DIV



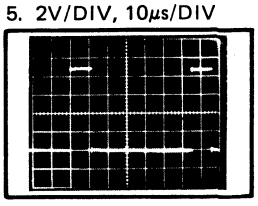
3. 1V/DIV, 10μs/DIV



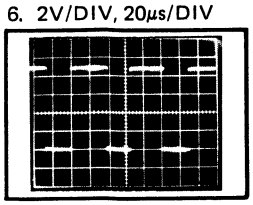
4. 1V/DIV, 5ms/DIV



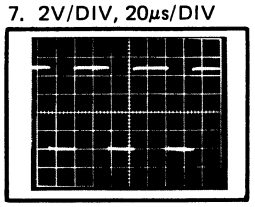
5. 2V/DIV, 10μs/DIV



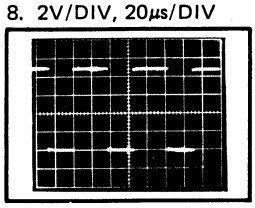
6. 2V/DIV, 20μs/DIV



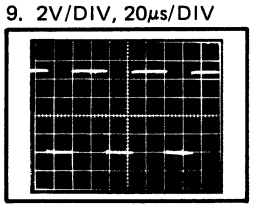
7. 2V/DIV, 20μs/DIV



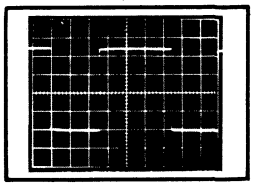
8. 2V/DIV, 20μs/DIV



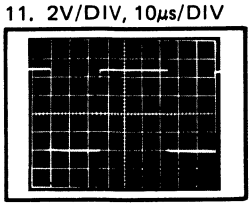
9. 2V/DIV, 20μs/DIV



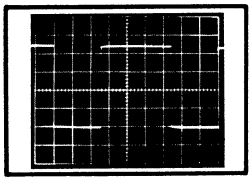
10. 2V/DIV, 10μs/DIV



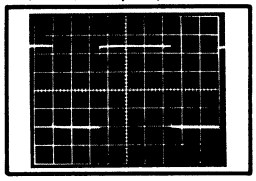
11. 2V/DIV, 10μs/DIV



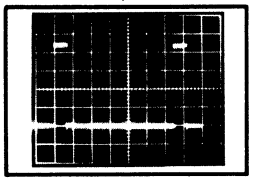
12. 2V/DIV, 10μs/DIV



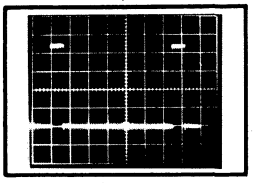
13. 2V/DIV, 10μs/DIV



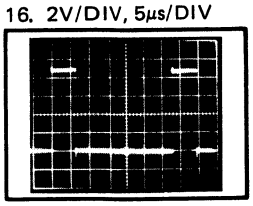
14. 2V/DIV, 10μs/DIV



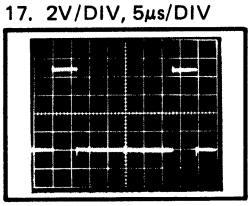
15. 2V/DIV, 10μs/DIV



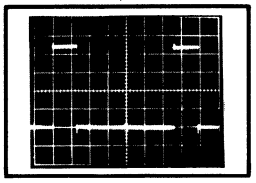
16. 2V/DIV, 5μs/DIV



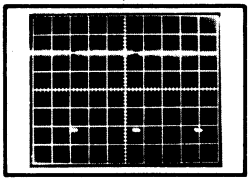
17. 2V/DIV, 5μs/DIV



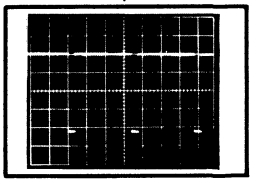
18. 2V/DIV, 5μs/DIV



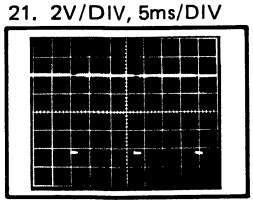
19. 2V/DIV, 5ms/DIV



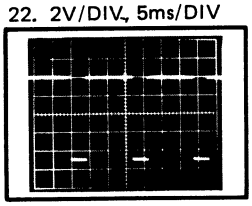
20. 2V/DIV, 5ms/DIV



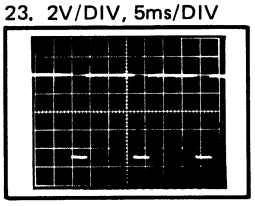
21. 2V/DIV, 5ms/DIV



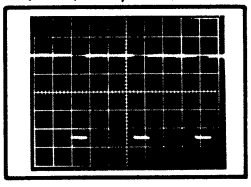
22. 2V/DIV, 5ms/DIV



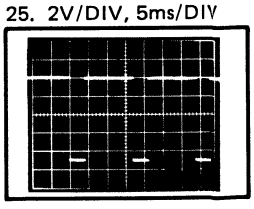
23. 2V/DIV, 5ms/DIV



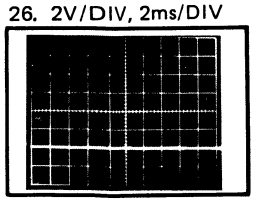
24. 2V/DIV, 5ms/DIV



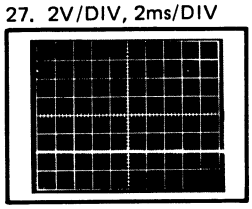
25. 2V/DIV, 5ms/DIV



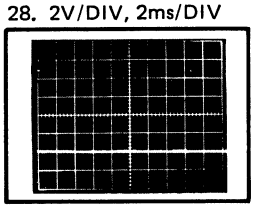
26. 2V/DIV, 2ms/DIV



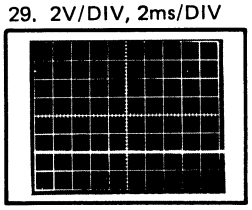
27. 2V/DIV, 2ms/DIV



28. 2V/DIV, 2ms/DIV



29. 2V/DIV, 2ms/DIV



Sync Board

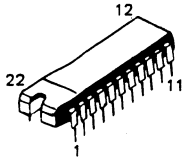
IC1	YWSC6433	C, D2	IC18	HD14584BP	D4	IC35	MN4069UB	D5, E5	D4	MA151K (MH)	E5
IC2	YW-MC4044P	E2	IC19	MN4011B	A, B5	IC36	MN4069UB	E7	D5	MA151K (MH)	E5
IC3	YW-MC4024P	E3	IC20	HD14081BP	A, B6	IC37	HD14584BP	A5,B4,B5	D6	MA151K (MH)	D5
IC4	MN4517B	C4	IC21	MN4019B	A, B6	IC38	YFM50143001P	D6,E6	D7	MA151K (MH)	D5
IC5	HD14006BP	C4, 5	IC22	YWHD14013BP	D7, E7	IC40	MN4011B	A4,B5	D8	MA151K (MH)	D5
IC6	HD14006BP	C5, 6	IC23	MN4023B	D7, E7	IC41	MN74HC393	E2	D9	MA151K (MH)	D5
IC7	MN4015B	C5	IC24	MN4023B	E7	IC42	HD14049BCP	D4, 5	D10	MA151K (MH)	D5
IC8	HD14071BP	B5, C5	IC25	HD14071BP	E6	IC43	YWNJM78L05A	D2	D11	1SV53B	C2
IC9	MN4019B	C6	IC26	MN4528B	A6, 7	Q1	2SC2295-BC (V)	C3			
IC10	MN4040B	A, B2	IC27	MN4528B	A6, 7	Q2	2SC2295-BC (V)	C3			
IC11	MN4019B	A, B3	IC28	MN4528B	B6, 7	Q3	2SC2295-BC (V)	D3			
IC12	HD14081BP	A, B3	IC29	MN4528B	B6, 7	Q4	2SC2295-BC (V)	D3			
IC13	HD14081BP	A2, 3	IC30	MN4024B	E4	Q5	2SC2295-BC (V)	E3			
IC14	HD14081BP	A4, B4	IC31	MN4028B	E4	Q6	2SC2295-BC (V)	D3			
IC15	MN4043B	A4, B4	IC32	MN4011B	E5	D1	MA151K (MH)	E2			
IC16	MN4520B	B4	IC33	HD14081BP	D5	D2	MA151K (MH)	E2			
IC17	MN4556B	A5	IC34	HD14081BP	D4, E5	D3	MA151K (MH)	E5			

Sync Board

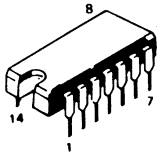
IC1	YWSC6433	B7
IC2	YW-MC4044P	A6, B6
IC3	YW-MC4024P	A6, B6
IC4	MN4517B	B1
IC5	HD14006BP	C1
IC6	HD14006BP	C2
IC7	MN4015B	C2
IC8	HD14071BP	B2
IC9	MN4019B	C2
IC10	MN4040B	B2
IC11	MN4019B	B2
IC12	HD14081BP	A2, B2
IC13	HD14081BP	A2, B2
IC14	HD14081BP	A3, B3
IC15	MN4043B	A2, B2
IC16	MN4520B	A3, B3
IC17	MN4556B	A4, B4
IC18	HD14584BP	A1, B1
IC19	MN4011B	A4, B4
IC20	HD14081BP	B5
IC21	MN4019B	B5
IC22	YWHD14013BP	C4
IC23	MN4023B	C4
IC24	MN4023B	B4
IC25	HD14071BP	C3
IC26	MN4528B	A5, B5
IC27	MN4528B	B5
IC28	MN4528B	C5
IC29	MN4528B	C5
IC30	MN4024B	B6
IC31	MN4028B	B6
IC32	MN4011B	B7
IC33	HD14081BP	C6
IC34	HD14081BP	C6
IC35	MN4069UB	C7
IC36	MN4069UB	B3
IC37	HD14584BP	B3
IC38	YFM50143001P	C7
IC40	MN4011B	B4
IC41	MN74HC393	A7, B7
IC42	HD14049BCP	C5
IC43	YWNJM78L05A	A5

Q1	2SC2295-BC (V)	A7
Q2	2SC2295-BC (V)	B8
Q3	2SC2295-BC (V)	A7
Q4	2SC2295-BC (V)	A7
Q5	2SC2295-BC (V)	A7
Q6	2SC2295-BC (V)	A7
D1	MA151K (MH)	B7
D2	MA151K (MH)	B7
D3	MA151K (MH)	C6
D4	MA151K (MH)	C6
D5	MA151K (MH)	B6
D6	MA151K (MH)	C6
D7	MA151K (MH)	C6
D8	MA151K (MH)	C6
D9	MA151K (MH)	B6
D10	MA151K (MH)	B6
D11	1SV53B	B8

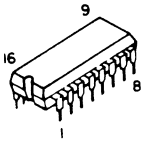
YWSC6433



YW-MC4044P
YW-MC4024P
MN4023B
MN4528B
MN4011B
HD14071BP
HD14006BP
HD14081BP
MN74HC393
MN4069UB
YWHD14013BP
HD14584BP
MN4024B



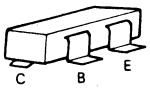
MN4517B
MN4015B
MN4019B
MN4040B
MN4043B
MN4520B
MN4556B
MN4528B
MN4028B
HD14049BCP
YFM50143001P



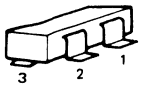
YWNJM78L05A

1 : OUT
2 : GND
3 : IN

2SC2295-BC

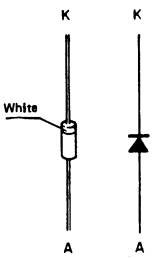


MA151K



1 : NC
2 : Anode
3 : Cathode

HV1SV53B



CONDUCTOR VIEW OF SYNC BOARD (WJ-400)

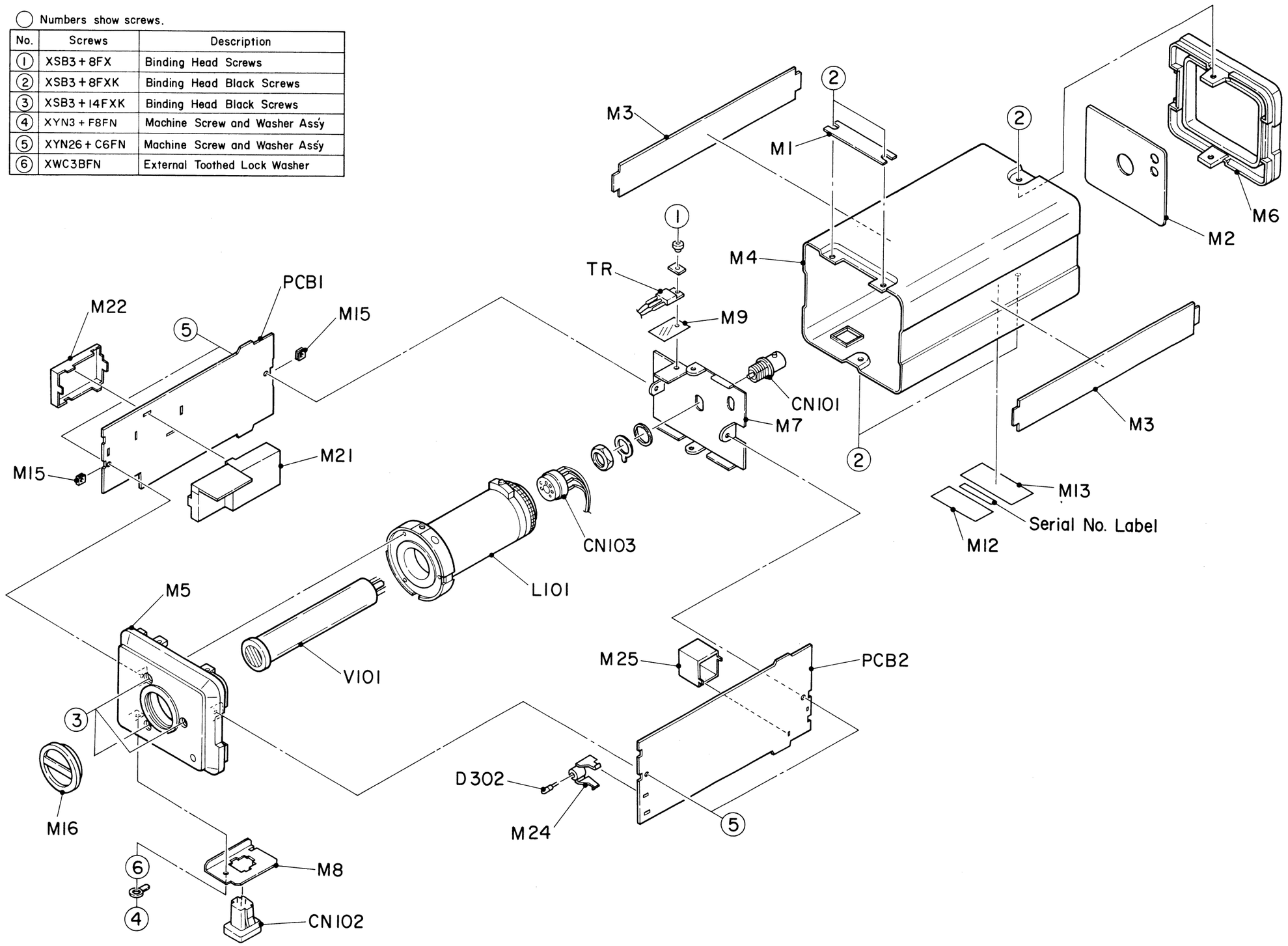
SYNC BOARD

CONDUCTOR VIEW OF SYNC BOARD (WJ-400)

EXPLODED VIEW OF CAMERA WV-041, WV-046

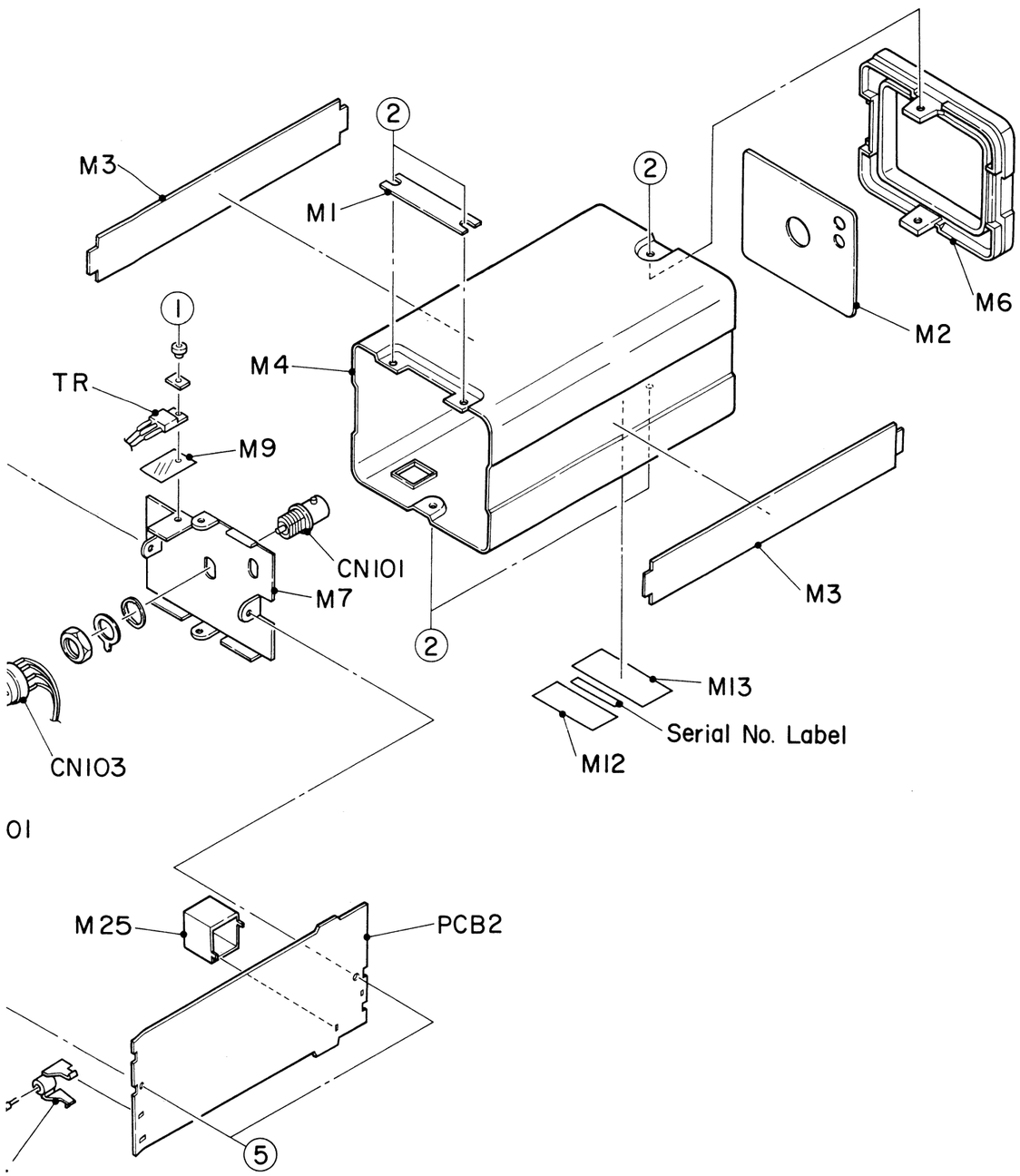
◯ Numbers show screws.

No.	Screws	Description
①	XSB3+8FX	Binding Head Screws
②	XSB3+8FXK	Binding Head Black Screws
③	XSB3+14FXK	Binding Head Black Screws
④	XYN3+F8FN	Machine Screw and Washer Assy
⑤	XYN26+C6FN	Machine Screw and Washer Assy
⑥	XWC3BFN	External Toothed Lock Washer



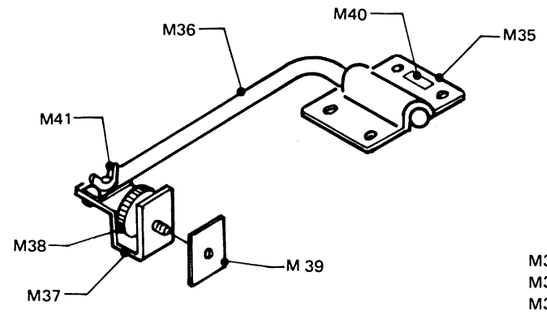
PCB1	YFVKB0041E1A
	YFVKB0046E1A
PCB2	YFVKC0041E1A
	YFVKC0046E1A
V101	20PE14NL
	S4092
L101	YFKV-19JI
CN101	YWBNC-R
CN102	YFVLKA0079A4
CN103	YFS7502B602
M1	YFV5WA0259A4
	YFV5WA0261A4
M2	YFV5WA0260A4
	YFV5WA0262A4
M3	YFV5WA0263A4
	YFV5WB0263A4
	YFV5WC0263A4
	YFV5WD0263A4
M4	YFV5EA0353A2
	YFV5EB0353A2
M5	YFV5BA0027A2
M6	YFV5BA0028A3
M7	YFV2KA0137A3
M8	YFV2SA0230A4
M9	YWV1600LB01
M12	YFV7MA0106A4
M13	YFV7QA1022A4
	YFV7QA1023A4
	YFV7QA1024A4
	YFV7QA1030A4
	YFV7QA1031A4
	YFV7QA1032A4
M15	YFV1KA0002A4
M16	YWBC-2B
M21	YFV2HA0329A4
M22	YFV2HA0330B4
M24	YWE6400FR09
M25	YWV465-GM03A

OF CAMERA WV-041, WV-046



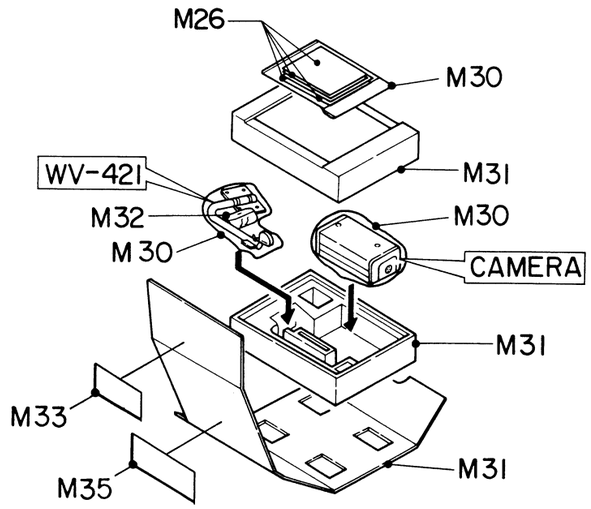
PCB1	YFVKB0041E1A
	YFVKB0046E1A
PCB2	YFVKC0041E1A
	YFVKC0046E1A
V101	20PE14NL
	S4092
L101	YFKV-19JI
CN101	YWBNC-R
CN102	YFVLKA0079A4
CN103	YFS7502B602
M1	YFV5WA0259A4
	YFV5WA0261A4
M2	YFV5WA0260A4
	YFV5WA0262A4
M3	YFV5WA0263A4
	YFV5WB0263A4
	YFV5WC0263A4
	YFV5WD0263A4
M4	YFV5EA0353A2
	YFV5EB0353A2
M5	YFV5BA0027A2
M6	YFV5BA0028A3
M7	YFV2KA0137A3
M8	YFV2SA0230A4
M9	YWV1600LB01
M12	YFV7MA0106A4
M13	YFV7QA1022A4
	YFV7QA1023A4
	YFV7QA1024A4
	YFV7QA1030A4
	YFV7QA1031A4
	YFV7QA1032A4
M15	YFV1KA0002A4
M16	YWBC-2B
M21	YFV2HA0329A4
M22	YFV2HA0330B4
M24	YWE6400FR09
M25	YWV465-GM03A

EXPLODED VIEW OF MOUNTING ANGLE WV-421



M35	YWV421-AM01A
M36	YWV421-AM02A
M37	YWV421-AM03
M38	YWV421-EM01U
M39	YWV421-BR01
M40	YWV421EUB01A
M41	YWV421EM50

PACKAGING OF CAMERA



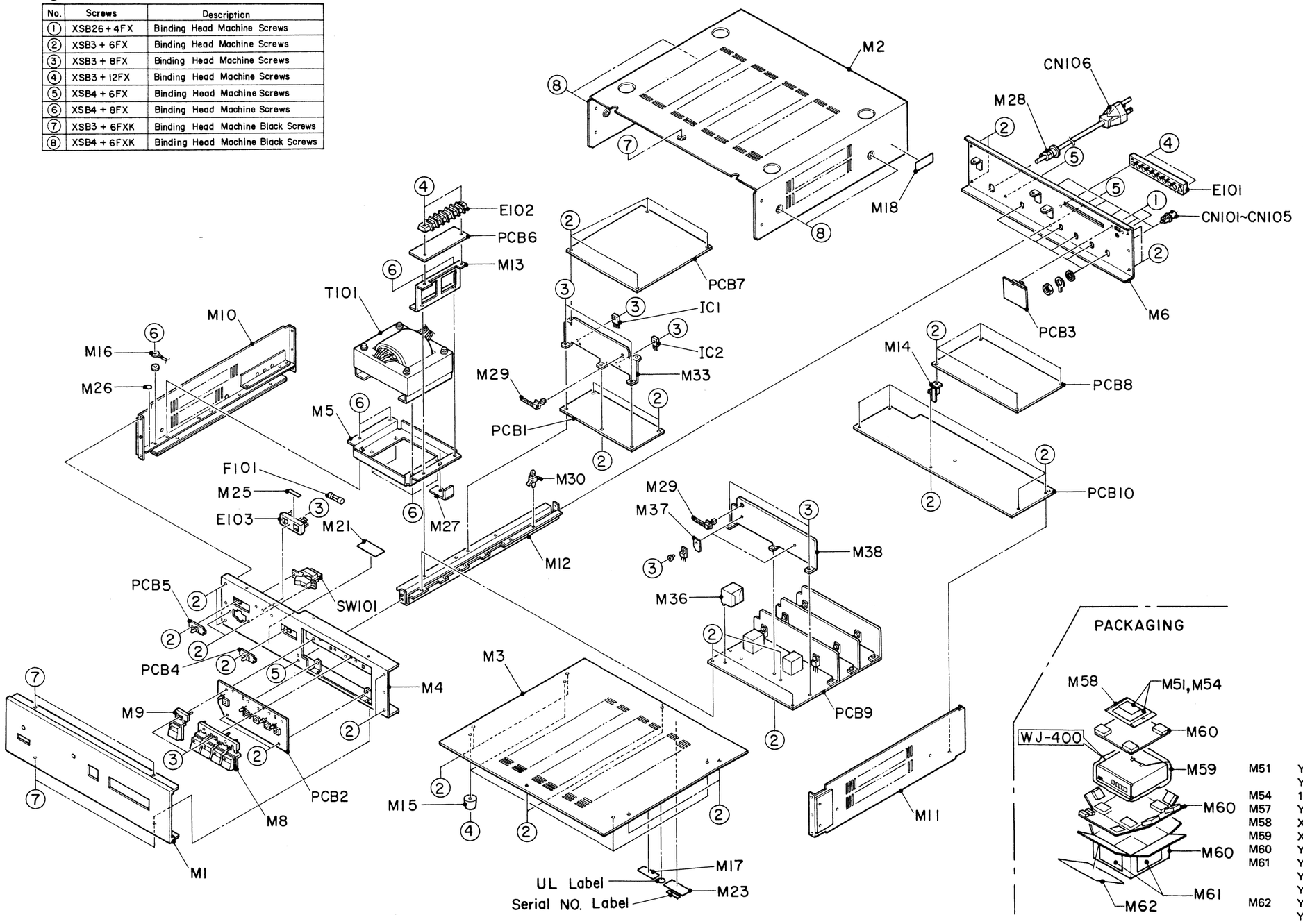
M26	YFV8QA0979AN
	YFV8QA0980AN
M30	YWT20X35C03
M31	YFV9CA0779AN
	YFV9CA0780AN
	YFV9CA0781AN
	YFV9CA0782AN
M32	YWT10X10C03
M33	YFV8FA0002A4
	YFV8FA0016A4
M35	YFV8FA0070A4
	YFV8FA0071A4

EXPLODED VIEW OF QUAD UNIT (WJ-400)

PCB1	YFVKBJ400J1A
PCB2	YFVKCJ400J1A
PCB3	YFVKDJ400J1A
PCB4	YFVKEJ400J1A
PCB5	YFVKEJ400J1A
PCB6	YFVKFJ400E1A
PCB7	YFVKZJ400J1A
PCB8	YFVKZJ400J2A
PCB9	YFVKZJ400J3A
PCB10	YFVKZJ400E4A
T101	YFPHE96V038
SW101	EST1554
F101	XBA2C05ET0A
CN101-105	YWBNC-R
CN106	YFHBS308B
	YFVM009908A
	YFKPGTSA25
	YFCE009908FA
E101	YFS01BFB8P
E103	YWX-N1153-07
M1	YFV5WB0258A2
	YFV5WC0258A2
	YFV5WD0258A2
M2	YFV5EA0351A1
M3	YFV5EA0352A1
M4	YFV2KA0134A2
M5	YFV2KA0136A3
M6	YFV2KB0135A2
M7	YFV2KC0135A2
M8	YFV6JA0033B3
M9	YFV6JE0033A3
M10	YFV2SA0225A2
M11	YFV2SA0226A2
M12	YFV2SA0227A2
M13	YFV2SA0228A4
M14	YFV2SA0229A4
M15	YWV5350WB01
M16	YW-BCG-EM01
M18	YFV7MA0106A4
M21	YFV7MA0120A4
M23	YFV7QA1009A4
	YFV7QA1011A4
	YFV7QA1010A4
M25	YFV7MA0149A4
M26	YW-BCG-UR01B
M27	YFV2GA0005A4
M28	YWSR6W-1
M29	PLP2S
M30	KGLS3S
M33	YFV7DA0038A3
M36	YWV52-LM05
M37	YWV1600LB01
M38	YFV7DA0037A3

◯ Numbers show screws

No.	Screws	Description
①	XSB26+4FX	Binding Head Machine Screws
②	XSB3+6FX	Binding Head Machine Screws
③	XSB3+8FX	Binding Head Machine Screws
④	XSB3+12FX	Binding Head Machine Screws
⑤	XSB4+6FX	Binding Head Machine Screws
⑥	XSB4+8FX	Binding Head Machine Screws
⑦	XSB3+6FXK	Binding Head Machine Black Screws
⑧	XSB4+6FXK	Binding Head Machine Black Screws



PACKAGING

M51	YFV8QA0970AN
	YFV8QA0971AN
M54	19998700331
M57	YWT20X35C03
M58	XZB26X40C05
M59	XZB45X63C05
M60	YFV9CA0774AN
M61	YFV8FA0002A4
	YNL1E
	YFV8FA0016A4
M62	YFV8FA0070A4
	YFV8FA0071A4

Important Notice

REPLACEMENT PARTS LIST

1. Components identified by ⚠ mark have special characteritics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Components identified by o mark are new parts used from this model.
3. Complete printed circuit board assembly is not available as replacement part.

SYM-BOL NO.	PART NO.	DESCRIPTION
	CCTV CAMERA WV-041/WV-046	
	MISCELLANEOUS	
V101	20PE14NL	Pick-up Tube for WV-041 Series
	S4092	Pick-up Tube for WV-046 Series
L101	YFKV-19JI	Deflection Coil
CN101	YWBNC-R	BNC Connector
CN102	YFVLKA0079A4	ALC Connector Assy for WV-046 Series
CN103	YFS7502B602	Pick-up Tube Socket Assy
M1	oYFV5WA0259A4	Upper Panel for WV-041E, WV-041NC, WV-046E, WV-046NC
	oYFV5WA0261A4	Upper Panel for WV-041F, WV-046F
M2	oYFV5WA0260A4	Rear Panel for WV-041E, WV-041NC, WV-046E, WV-046NC
	oYFV5WA0262A4	Rear Panel for WV-041F, WV-046F
M3	oYFV5WA0263A4	Side Panel for WV-041NC
	oYFV5WB0263A4	Side Panel for WV-041E, WV-041F
	oYFV5WC0263A4	Side Panel for WV-046NC
	oYFV5WD0263A4	Side Panel for WV-046E, WV-046F
M4	oYFV5EA0353A2	Cover for WV-041 Series
	oYFV5EB0353A2	Cover for WV-046 Series
M5	oYFV5BA0027A2	Front Escutcheon
M6	oYFV5BA0028A3	Rear Escutcheon
M7	oYFV2KA0137A3	Rear Chassis
M8	YFV2SA0230A4	ALC Mounting Plate for WV-046 Series
M9	YWV1600LB01	Mica
M12	YFV7MA0106A4	Caution Label
M13 ⚠	oYFV7QA1022A4	Main Label for WV-041E
	oYFV7QA1023A4	Main Label for WV-041F
	oYFV7QA1024A4	Main Label for WV-041NC
⚠	oYFV7QA1030A4	Main Label for WV-046E
⚠	oYFV7QA1031A4	Main Label for WV-046F
⚠	oYFV7QA1032A4	Main Label for WV-046NC
M16	YWBC-2B	Body Cap
	VIDEO BOARD	
PCB1	oYFVKB0041E1A	Printed Circuit Board Assy for WV-041
	oYFVKB0046E1A	Printed Circuit Board Assy for WV-046
IC101	NJM3415D	IC
Q1	2SK321-Q	FET
Q2	2SC2404-CD	Transistor
Q3	2SA1022-C	Transistor
Q4	2SC2404-CD	Transistor
Q5	2SA1022-C	Transistor
Q6	2SC2404-CD	Transistor
Q7	2SD601-QR	Transistor
Q8	2SB709-Q	Transistor
Q9	2SB709-Q	Transistor for WV-046
Q10	2SB709-Q	Transistor
Q11	2SD601-QR	Transistor
Q12	2SB709-Q	Transistor
Q13	2SD601-QR	Transistor for WV-046
Q14	2SC2405STU	Transistor for WV-041
Q15,16	2SD601-QR	Transistor
Q101	2SD601-QR	Transistor
Q102,103	2SD602-Q	Transistor
Q104,105	2SD601-QR	Transistor
Q106	2SC1398-QR	Transistor
Q107	2SC2590-QR	Transistor
Q202	2SB709-Q	Transistor
Q203	2SD601-QR	Transistor
Q205	2SC2590-QR	Transistor
Q206	2SB709-Q	Transistor
Q207	2SD601-QR	Transistor
D1,2	MA151K	Diode
D3	RD5.1JB2	Diode for WV-046
D4	MA153	Diode
D6,7	0A91	Diode for WV-041
D101,102	RD5.1JT1B2	Diode
D201,202	EU01Z	Diode
TH1	ERTD2FHK462S	Thermistor for WV-041
R1	YF2116334JT	Carbon 330K ohms 1/16W
R2	ERJ8GCSJ106	Carbon 10M ohsm 1/8W for WV-041
R3	YF2116475KT	Carbon 4.7M 1/16W
R4	YF2116684JT	Carbon 680K ohms 1/16W
R5	YF2116564JT	Carbon 560 ohms 1/16W
R6	YF2116682JT	Carbon 6.8K ohms 1/16W
R7	YF2116101JT	Carbon 100 ohms 1/16W
R8	YF2116821GT	Carbon 820 ohms 1/16W
R9	YF2116151JT	Carbon 150 ohms 1/16W
R11	YF2116332JT	Carbon 3.3K ohms 1/16W
R12	YF2116333GT	Carbon 33K ohms 1/16W
R13	YF2116222GT	Carbon 2.2K ohms 1/16W
R14	YF2116102GT	Carbon 1K ohms 1/16W
R15	YF2116220JT	Carbon 22 ohms 1/16W for WV-041
	YF2116150JT	Carbon 15 ohms 1/16W for WV-046
R16	YF2116330JT	Carbon 33 ohms 1/16W
R17	YF2116391JT	Carbon 390 ohms 1/16W
R18	YF2116152JT	Carbon 1.5K ohms 1/16W
R19	YF2116272JT	Carbon 2.7K ohms 1/16W
R20	YF2116102GT	Carbon 1K ohms 1/16W for WV-041
	YF2116152JT	Carbon 1.5K ohsm 1/16W for WV-046
R21	YF2116333GT	Carbon 33K ohms 1/16W
R22	YF2116182GT	Carbon 1.8K ohms 1/16W for WV-041
	YF2116152JT	Carbon 1.5K ohms 1/16W for WV-046
R23	YF2116101JT	Carbon 100 ohms 1/16W
R24	YF2116102GT	Carbon 1K ohms 1/16W
R25	YF2116680JT	Carbon 68 ohms 1/16W
R26	YF2116221JT	Carbon 220 ohms 1/16W
R27	YF2116152JT	Carbon 1.5K ohms 1/16W
R28	YF2116561JT	Carbon 560 ohms 1/16W
R29	YF2116563JT	Carbon 56K ohms 1/16W
R30	YF2116333GT	Carbon 33K ohms 1/16W
R31	YF2116103JT	Carbon 10K ohms 1/16W
R32	YF2116222GT	Carbon 2.2K ohms 1/16W
R33	YF2116562JT	Carbon 5.6K ohms 1/16W
R34	YF2116102GT	Carbon 1K ohms 1/16W
R35	YF2116682JT	Carbon 6.8K ohms 1/16W
R36	YF2116471JT	Carbon 470 ohms 1/16W
R37	YF2116471JT	Carbon 470 ohms 1/16W for WV-046
R38	YF2116470JT	Carbon 47 ohms 1/16W for WV-041
	YF2116221JT	Carbon 220 ohms 1/16W for WV-046
R39	YF2116102GT	Carbon 1K ohms 1/16W for WV-041
	YF2116152JT	Carbon 1.5K ohms 1/16W for WV-046
R40	YF2116391JT	Carbon 390 ohms 1/16W for WV-041
	YF2116471JT	Carbon 470 ohms 1/16W for WV-046
R41	YF2116392JT	Carbon 3.9K ohms 1/16W
R42	YF2116392JT	Carbon 3.9K ohms 1/16W for WV-046
R43	YF2116471JT	Carbon 470 ohms 1/16W for WV-046
R44	YF2116821GT	Carbon 820 ohms 1/16W
R45	ERD25FJ121	Carbon 120 ohms 1/4W
R46	YF2116562JT	Carbon 5.6K ohms 1/16W
R47	YF2116682JT	Carbon 6.8K ohms 1/16W
R48	YF2116680JT	Carbon 68 ohms 1/16W
R49	YF2116392JT	Carbon 3.9K ohms 1/16W
R51	YF2116822JT	Carbon 8.2K ohms 1/16W
R52	YF2116332JT	Carbon 3.3K ohms 1/16W
R54	YF2116333GT	Carbon 33K ohms 1/16W for WV-046
R55	YF2116102GT	Carbon 1K ohms 1/16W for WV-041
	YF2116152JT	Carbon 1.5K ohms 1/16W for WV-046
R56	YF2116821JT	Carbon 820 ohms 1/16W for WV-046
R57	YF2116104JT	Carbon 100K ohms 1/16W for WV-046
R58	YF2116683GT	Carbon 68K ohms 1/16W for WV-041
R59	YF2116123JT	Carbon 12K ohms 1/16W for WV-041
R101	YF2116332JT	Carbon 3.3K ohms 1/16W
R102,103	YF2116333GT	Carbon 33K ohms 1/16W
R104	YF2116750JT	Carbon 75 ohms 1/16W
R105	YF2116392JT	Carbon 3.9K ohms 1/16W
R106	YF2116332JT	Carbon 3.3K ohms 1/16W
R107	YF2116273JT	Carbon 27K ohms 1/16W
R108	YF2116392JT	Carbon 3.9K ohms 1/16W
R109	YF2116121JT	Carbon 120 ohms 1/16W
R111	YF2116682JT	Carbon 6.8K ohms 1/16W
R112	ERX1SJ2R2P	Metal 2.2 ohms 1W
R113	ERG2SJ560P	Metal 56 ohms 2W
R114	YF2116332JT	Carbon 3.3K ohms 1/16W
R115	YF2116182GT	Carbon 1.8K ohms 1/16W
R116	YF2116472JT	Carbon 4.7K ohms 1/16W
R117	ER025CKF3901	Metal 3.9K ohms 1/4W
R118	ER025CKF5101	Metal 5.1K ohms 1/4W
R203	YF2116103JT	Carbon 10K ohms 1/16W
R204,205	YF2116124GT	Carbon 120K ohms 1/16W
R206	YF2116103JT	Carbon 10K ohms 1/16W
R207	YF2116222GT	Carbon 2.2K ohms 1/16W
R208	YF2116333GT	Carbon 33K ohms 1/16W
R211	YF2116182GT	Carbon 1.8K ohms 1/16W
R212	ERJ8GCSJ331	Carbon 330 ohms 1/16W
R213	ERJ8GCSJ680	Carbon 68 ohms 1/16W
R214	YF2116123JT	Carbon 12K ohms 1/16W
R215	YF2116153JT	Carbon 15K ohms 1/16W
R216	YF2116333GT	Carbon 33K ohms 1/16W
VR1	EVND1AA00BE3	Variable Resistor 2.2K ohms
VR201,202	EVND1AA00BC5	Variable Resistor 150K ohms
VR203	EVND1AA00BY2	Variable Resistor 330 ohms
VR204	EVND1AA00BE2	Variable Resistor 220 ohms
C1	ECQV1H224JZ	Plastic 0.22 µF 50V
C2	ECQM1H223JZ	Plastic 0.022 µF 50V
C3	YF400240CHJT	Ceramic 24 pF
C5,6	ECEA1AKS470	Electrolytic 47 µF 10V
C7	ECEA1AKS330	Electrolytic 33 µF 10V
C8	ECEA1CU101	Electrolytic 100 µF 16V
C9	YF400472XKT	Ceramic 4700 pF
C11	ECQV1H473JZ	Plastic 0.047 µF 50V
C12	ECEA1VKS4R7	Electrolytic 4.7 µF 35V
C13	ECEA1AKS330	Electrolytic 33 µF 10V
C14	ECEA1CU101	Electrolytic 100 µF 16V
C15	ECEA1CU100	Electrolytic 10 µF 16V
C16	ECEA1AU221	Electrolytic 220 µF 10V
C17	ECEA1AU470	Electrolytic 47 µF 10V
C18	ECEA1CU101	Electrolytic 100 µF 16V
C19	ECEA1VU4R7	Electrolytic 4.7 µF 35V
C21	ECEA1EU471	Electrolytic 470 µF 25V
C22	ECEA1AKS330	Electrolytic 33 µF 10V
C23	ECEA1VKS3R3	Electrolytic 3.3 µF 35V for WV-041
C24	YF400331CHJT	Ceramic 330 pF
C101,102	YF400122SLKT	Ceramic 1200 pF
C103	ECEA1AU101	Electrolytic 100 µF 10V
C104	ECEA1AU221	Electrolytic 220 µF 10V
C105	ECEA1CU101	Electrolytic 100 µF 16V
C201	YF426683XKT	Ceramic 0.068 µF
C202	ECQM1H563JZ	Plastic 0.056 µF 50V
C203	ECEA1AU221	Electrolytic 220 µF 10V
C204	ECQV1H473JZ	Plastic 0.047 µF 50V
C205	ECQM2122KZ	Plastic 1200 pF
C206	ECSF1CE336	Electrolytic 33 µF 16V
C207	ECQM1H684JZ	Plastic 0.68 µF 50V
L201	YWL8122J	Coil 1.2 mH

SYM-BOL NO.	PART NO.	DESCRIPTION
J1	YF21160R00T	Jumper Resistor
CN1-JM	EMCS0250Z	2 pin Jack Male
CN2-JM	EMCS1150Z	11 pin Jack Male
CN3-JM	EMCS0550Z	5 pin Jack Male
CN4-JM	EMCS0350Z	3 pin Jack Male for WV-046
E1-5	YW32BM4R5	Terminal
M15	o YFV1KA0002A4	Washer
M21	o YFV2HA0329A4	Shield Case
M22	o YFV2HA0330B4	Shield Cover

HIGH VOLTAGE BOARD

PCB2	o YFVKC0041E1A	Printed Circuit Board Assy for WV-041
	o YFVKC0046E1A	Printed Circuit Board Assy for WV-046
IC301	HD74LS00P	IC
IC302	YWMSM4049	IC
IC303,304	HD74HC4538BP	IC
Q201	2SD601-QR	Transistor
Q204	2SB710-QRS	Transistor
Q301	2SD601-QR	Transistor
Q401,402	2SD602-Q	Transistor
Q403	2SD601A-QR	Transistor
Q404	2SD601-QR	Transistor
Q405	2SD601-QR	Transistor for WV-041
Q406	2SB710-QRS	Transistor
D301	RD5.1JT1B2	Diode
D302	LN23L	LED
D303	MA151WA	Diode
D304,305	MA151K	Diode
D401	EM01Z	Diode
D402-406	EU01AV0	Diode
D407	RD6.8JT1B1	Diode
R201	YF2116333GT	Carbon 33K ohms 1/16W
R202	YF2116123JT	Carbon 12K ohms 1/16W
R209	YF2116562JT	Carbon 5.6K ohms 1/16W
R301	YF2116561JT	Carbon 560 ohms 1/16W
R302	YF2116331JT	Carbon 330 ohms 1/16W
R303	YF2116332JT	Carbon 3.3K ohms 1/16W
R304	YF2116562JT	Carbon 5.6K ohms 1/16W
R305	ER025CKF8202	Metal 82K ohms 1/4W
R306	YF2116473GT	Carbon 47K ohms 1/16W
R307	YF2116183GT	Carbon 18K ohms 1/16W
R308	YF2116394JT	Carbon 390K ohms 1/16W
R309	ER025CKF4701	Metal 4.7K ohms 1/4W
R311	YF2116183GT	Carbon 18K ohms 1/16W
R312	ER025CKF9101	Metal 9.1K ohms 1/4W
R313	YF2116102GT	Carbon 1K ohms 1/16W
R314,315	YF2116473GT	Carbon 47K ohms 1/16W
R316	YF2116103JT	Carbon 10K ohms 1/16W
R317	YF2116101JT	Carbon 100 ohms 1/16W
R401	YF2116102GT	Carbon 1K ohms 1/16W
R402	YF2116103JT	Carbon 10K ohms 1/16W
R403,404	YF2116562JT	Carbon 5.6K ohms 1/16W
R405-408	YF2116222GT	Carbon 2.2K ohms 1/16W
R409	YF2116223JT	Carbon 22K ohms 1/16W

SYM-BOL NO.	PART NO.	DESCRIPTION
R411	YF2116822JT	Carbon 8.2K ohms 1/16W
R413	YF2116103JT	Carbon 10K ohms 1/16W
R414	YF2116333GT	Carbon 33K ohms 1/16W for WV-041
R415	YF2116684JT	Carbon 680K ohms 1/16W for WV-041
R416,417	ERD25FJ824	Carbon 820K ohms 1/4W
R418,419	YF2116333GT	Carbon 33K ohms 1/16W
R420	YF2116684JT	Carbon 680K ohms 1/16W
R421	YF2116273JT	Carbon 27K ohms 1/16W for WV-041
	YF2116153JT	Carbon 1.5K ohms 1/16W for WV-046
R422-424	YF2116105GT	Carbon 1M ohms 1/16W
R425	YF2116334JT	Carbon 330K ohms 1/16W
R426	YF2116102GT	Carbon 1K ohms 1/16W
R427	YF2116473GT	Carbon 47K ohms 1/16W
R428	ERJ8GCSJ154	Carbon 150K ohms 1/8W for WV-041
	ERJ8GCSJ104	Carbon 100K ohms 1/8W for WV-046
R429	YF2116332JT	Carbon 3.3K ohms 1/16W
R431	ERG1SJ300P	Metal 30 ohms 1W
VR401	YFH0622A1M	Variable Resistor 1M ohms
VR402	EVND1AA00BY5	Variable Resistor 330K ohms for WV-041
VR403	EVND1AA00BQ5	Variable Resistor 470K ohms
VR404	YFH0622A1M	Variable Resistor 1M ohms
C208	ECQM1H104JZ	Plastic 0.1 µF 50V
C300	ECQM1H104JZ	Plastic 0.1 µF 50V
C301	ECEA1AU101	Electrolytic 100 µF 10V
C302	ECEA1CU100	Electrolytic 10 µF 16V
C303,304	YF400102XKT	Ceramic 1000 pF
C305	ECQM1H104JZ	Plastic 0.1 µF 50V
C306	ECQM1H223JZ	Plastic 0.022 µF 50V
C307	YF400272XKT	Ceramic 2700 pF
C308-310	ECQM1H104JZ	Plastic 0.1 µF 50V
C311	YF400331CHJT	Ceramic 330 pF
C312	YF400181CHJT	Ceramic 180 pF
C313-315	YF426821CHJS	Ceramic 820 pF 50V
C316	YF400181CHJT	Ceramic 180 pF
C317	YF400101CHJT	Ceramic 100 pF
C318	ECEA1AU101	Electrolytic 100 µF 10V
C401	YF400101SLKT	Ceramic 100 pF
C402,403	YF400102XKT	Ceramic 1000 pF
C404,405	ECEA1VU4R7	Electrolytic 4.7 µF 35V
C406	YF400331CHJT	Ceramic 330 pF
C407	ECEA1AU330	Electrolytic 33 µF 10V
C408	ECEA1VU4R7	Electrolytic 4.7 µF 35V
C409,410	ECEA2AU010	Electrolytic 1 µF
C411	ECKD2H103PE	Ceramic 0.01 µF 500V
C412	ECEA2WS010	Electrolytic 1 µF 450V
C413,414	ECKD2H103PE	Ceramic 0.01 µF 500V
C415	MMH4473JE	Plastic 0.047 µF 400V
C416,417	ECKD2H103PE	Ceramic 0.01 µF 500V
C418	ECQE6473KZ	Plastic 0.047 µF 600V
L401	EL06SI101K	Coil 100 µH
T401	YFEP13K1AZ-T	Low Freq Transformer
J1-25	YF21160R00T	Jumper Resistor
M24	YWE6400FR09	LED Holder
M25	YWV465-GM03A	Shield Cover

SYM-BOL NO.	PART NO.	DESCRIPTION
ACCESSORY PARTS/PACKAGING PARTS		
M26	o YFV8QA0979AN	Operating Instruction for WV-041E, WV-041F, WV-046E, WV-046F
	o YFV8QA0980AN	Operating Instruction for WV-041NC, WV-046NC
M30	YWT20X35C03	Polyethylene Bag
M31	o YFV9CA0779AN	Packaging for WV-041E
	o YFV9CA0780AN	Packaging for WV-041F
	o YFV9CA0781AN	Packaging for WV-041NC
	o YFV9CA0782AN	Packaging for WV-046 Series
M32	YWT10X10C03	Polyethylene Bag
M33	YFV8FA0002A4	Packaging Label for WV-046E
M34	YFV8FA0016A4	Packaging Label for WV-046F
M35	YFV8FA0070A4	Packaging Label for WV-046E, WV-046NC
M36	YFV8FA0071A4	Packaging Label for WV-046F
M37	YNL1E	Packaging Label for WV-046NC
CAMERA MOUNTING BRACKET WV-421		
MISCELLANEOUS		
M35	YWV421-AM01A	Support Bracket
M37	YWV421-AM03	Camera Mounting Angle
M36	YWV421-AM02A	Arm
M39	YWV421-BR01	Stopper Plate
M40	YWV421EUB01A	Main Label
M38	YWV421-EM01U	Camera Mounting Special Screw
M41	YWV421EM50	
QUAD UNIT WJ-400		
MISCELLANEOUS		
C101,102	ECQU2A102MH	Plastic 1000 pF 250V
T101 ⚠	YFPHE96V038	Power Transformer
SW101 ⚠	EST1554	Seesaw Switch
F101 ⚠	XBA2C05ET0A	Current Fuse
CN101-105	YWBNC-R	BNC Connector
CN106 ⚠	YFHBS308B	AC Power Cord for WJ-400/B
⚠	YFVM009908A	AC Power Cord for WJ-400/G
⚠	YFKPGTSA25	AC Power Cord for WJ-400N/A
⚠	YFCE009908FA	AC Power Cord for WJ-400N/C
E101	YFS01BFB8P	8 pin Terminal
E103	YWX-N1153-07	Fuse Holder
M1	o YFV5WB0258A2	Front Panel for WJ-400/BCG
	o YFV5WC0258A2	Front Panel for WJ-400N/AC
	o YFV5WD0258A2	Front Panel for WJ-400F
M2	o YFV5EA0351A1	Upper Cover
M3	o YFV5EA0352A1	Bottom Cover
M4	o YFV2KA0134A2	Front Chassis
M5	o YFV2KA0136A3	Chassis
M6	o YFV2KB0135A2	Rear Chassis for WJ-400/BCG, WJ-400N/AC
M7	o YFV2KC0135A2	Rear Chasssis for WJ-400F
M8	o YFV6JA0033B3	Camera Selection Switch Knob
M9	o YFV6JE0033A3	Alarm Reset Switch Knob

SYM-BOL NO.	PART NO.	DESCRIPTION
M10	o YFV2SA0225A2	Left Side Mounting Angle A
M11	o YFV2SA0226A2	Right Side Mounting Angle B
M12	YFV2SA0227A2	Mounting Angle C for Center
M13	YFV2SA0228A4	Mounting Angle D for Terminal
M14	YFV2SA0229A4	Mounting Angle E for Board
M15	YWV5350WB01	Rubber Foot
M16	YW-BCG-EM01	Earth Lag
M18	YFV7MA0106A4	CSA Caution Label
M21	YFV7MA0120A4	Fuse Exchange Label
M23 ⚠	o YFV7QA1009A4	Main Label for WJ-400/BCG
⚠	o YFV7QA1011A4	Main Label for WJ-400N/AC
⚠	o YFV7QA1010A4	Main Label for WJ-400F
M25 ⚠	YFV7MA0149A4	Fuse Rated Label
M26 ⚠	YW-BCG-UR01B	Earth Label
M27	oYFV2GA0005A4	Cord Clamp Angle
M28	YWSR6W-1	Cord ClampA
M29	PLP2S	Cord Clamp B
M30	KGLS3S	Support
POWER BOARD		
PCB1	o YFVKBJ400J1A	Printed Circuit Board Assy
IC1	AN6531	IC
IC2	AN78N09	IC
IC3	YWHD14538BP	IC
Q1,2	2SC2377CD	Transistor
D1-9	EM01Z	Diode
R1	ERD25FJ103	Carbon 10K ohms 1/4W
R2	ER025TKF2202	Metal 22K ohms 1/4W
R3	ER025CKF4701	Metal 4.7K ohms 1/4W
R4,5	ERD25FJ103	Carbon 10K ohms 1/4W
R6	ERD25FJ393	Carbon 39K ohms 1/4W
R7	ERD10TJ564	Carbon 560K ohms 1/8W
R8	ERD10TJ103	Carbon 10K ohms 1/8W
R9	ERD10TJ472	Carbon 4.7K ohms 1/8W
R10	ERD10TJ154	Carbon 150K ohms 1/8W
R11	ERD10TJ104	Carbon 100K ohms 1/8W
VR1	YFH0521A4R7K	Variable Resistor 4.7K ohms
C1	ECES1JU222K	Electrolytic 2200 µF 63V
C2	ECEA1HSS010	Electrolytic 1 µF 50V
C3	ECEA1HU102	Electrolytic 1000 µF 50V
C4	ECES1EU682K	Electrolytic 6800 µF 25V
C5	ECEA1ASS102	Electrolytic 1000 µF 10V
C6	ECQM1H104JZ	Plastic 0.1 µF 50V
C7	ECEA1ESS470	Electrolytic 47 µF 25V
C8	ECEA1ESS220	Electrolytic 22 µF 25V
CN1-JM	EMCS0950Z	9 pni Jack Male
M33	YFV7DA0038A3	Heat Sink
SWITCH BOARD		
PCB2	o YFVKCJ400J1A	Printed Circuit Board Assy
D1-5	LN39GP	LED
R1,2	ERD25FJ331	Carbon 330 ohms 1/4W
R3	ERD25FJ102	Carbon 1K ohms 1/4W

SYM-BOL NO.	PART NO.	DESCRIPTION
SW1-5	YWKHG10905	Push Switch
CN3-JM	EMCS1350ZL	13 pin Jack Male
AUTO RESET BOARD		
PCB3	o YFVKDJ400J1A	Printed Circuit Board Assy
VR1	YFH1021A2R2M	Variable Resistor 2.2M ohms
SW7	YFSSB022L6NP	Slide Switch
CN4	EMCS0250Z	2 pin Jack Male
ALARM LED BOARD		
PCB4	o YFVKEJ400J1A	Printed Circuit Board Assy
D6	LN21RPHL	LED
POWER LED BOARD		
PCB5	o YFVKEJ400J1A	Printed Circuit Board Assy
D7	LN21RPHL	LED
CONNECTION BOARD		
PCB6	o YFVKFJ400E1A	Printed Circuit Board Assy
F1 ⚠	XBA2C05ET0A	Current Fuse 0.5A 250V
F2 ⚠	XBA2C04ET0A	Current Fuse 0.4A 250V
F3 ⚠	XBA2C25ET0A	Current Fuse 2.5A 250V
E1	YWSN5053	Fuse Holder
E102	YFS07B6P	6 pin Terminal
PROCESS BOARD		
PCB7	o YFVKZJ400J1A	Printed Circuit Board Assy
IC101	HD14046BP	IC
IC102	o MN4069UB	IC
IC103	MN4011B	IC
IC201	HD14046BP	IC
IC202	o MN4069UB	IC
IC203	MN4011B	IC
IC301	HD14046BP	IC
IC302	o MN4069UB	IC
IC401	HD14046BP	IC
IC402	o MN4069UB	IC
IC501	HD14049BCP	IC
IC502,503	o MN74HC4066	IC
Q101	2SA1254-BC	Transistor
Q102	2SB641-QR	Transistor
Q103	2SD636-Q	Transistor
Q104	2SA1254-BC	Transistor

SYM-BOL NO.	PART NO.	DESCRIPTION	
Q106	2SC2377CD	Transistor	
Q107,108	2SD661-TU	Transistor	
Q201	2SA1254-BC	Transistor	
Q202	2SB641-QR	Transistor	
Q203	2SD636-Q	Transistor	
Q204	2SA1254-BC	Transistor	
Q206	2SC2377CD	Transistor	
Q207,208	2SD661-TU	Transistor	
Q301	2SA1254-BC	Transistor	
Q302	2SB641-QR	Transistor	
Q303	2SD636-Q	Transistor	
Q304	2SA1254-BC	Transistor	
Q306	2SC2377CD	Transistor	
Q307,308	2SD661-TU	Transistor	
Q401	2SA1254-BC	Transistor	
Q402	2SB641-QR	Transistor	
Q403	2SD636-Q	Transistor	
Q404	2SA1254-BC	Transistor	
Q406	2SC2377CD	Transistor	
Q407,408	2SD661-TU	Transistor	
Q501,502	2SC2377CD	Transistor	
Q503	2SD661-TU	Transistor	
Q504,505	2SC2377CD	Transistor	
Q506	2SD636-Q	Transistor	
Q508	2SB641-QR	Transistor	
D501	MA4062M	Diode	
R101	ERD10TJ333	Carbon	33K ohms 1/8W
R102	ERD10TJ105	Carbon	1M ohms 1/8W
R103	ERD10TJ103	Carbon	10K ohms 1/8W
R104	ERD10TJ273	Carbon	27K ohms 1/8W
R105	ERD10TJ391	Carbon	390 ohms 1/8W
R106	o EROS2CKF5602	Metal	56K ohms 1/8W
R107	EROS2CKF2403	Metal	240K ohms 1/8W
R108	ERD10TJ822	Carbon	8.2K ohms 1/8W
R109	ERD10TJ392	Carbon	3.9K ohms 1/8W
R110,111	ERD10TJ103	Carbon	10K ohms 1/8W
R112	ERD10TJ333	Carbon	33K ohms 1/8W
R113	ERD10TJ562	Carbon	5.6K ohms 1/8W
R114	ERD25FJ101	Carbon	100 ohms 1/4W
R115	ERD10TJ680	Carbon	68 ohms 1/8W
R116	ERD10TJ153	Carbon	15K ohms 1/8W
R117	ERD10TJ752	Carbon	7.5K ohms 1/8W
R118	ERD10TJ101	Carbon	100 ohms 1/8W
R119	ERD10TJ102	Carbon	1K ohms 1/8W
R120	ERD10TJ270	Carbon	27 ohms 1/8W
R123	ERD10TJ101	Carbon	100 ohms 1/8W
R124	ERD10TJ222	Carbon	2.2K ohms 1/8W
R125	ERD10TJ272	Carbon	2.7K ohms 1/8W
R126	ERD10TJ103	Carbon	10K ohms 1/8W
R127	ERD10TJ152	Carbon	1.5K ohms 1/8W
R201	ERD10TJ333	Carbon	33K ohms 1/8W
R202	ERD10TJ105	Carbon	1M ohms 1/8W
R203	ERD10TJ103	Carbon	10K ohms 1/8W
R204	ERD10TJ273	Carbon	27K ohms 1/8W
R205	ERD10TJ391	Carbon	390 ohms 1/8W
R206	o EROS2CKF5602	Metal	56K ohms 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R207	EROS2CKF2403	Metal	240K ohms 1/8W
R208	ERD10TJ822	Carbon	8.2K ohms 1/8W
R209	ERD10TJ392	Carbon	3.9K ohms 1/8W
R210,211	ERD10TJ103	Carbon	10K ohms 1/8W
R212	ERD10TJ333	Carbon	33K ohms 1/8W
R213	ERD10TJ562	Carbon	5.6K ohms 1/8W
R214	ERD25FJ101	Carbon	100 ohms 1/4W
R215	ERD10TJ680	Carbon	68 ohms 1/8W
R216	ERD10TJ153	Carbon	15K ohms 1/8W
R217	ERD10TJ752	Carbon	7.5K ohms 1/8W
R218	ERD10TJ101	Carbon	100 ohms 1/8W
R219	ERD10TJ102	Carbon	1K ohms 1/8W
R220	ERD10TJ270	Carbon	27 ohms 1/8W
R223	ERD10TJ101	Carbon	100 ohms 1/8W
R224	ERD10TJ222	Carbon	2.2K ohms 1/8W
R225	ERD10TJ272	Carbon	2.7K ohms 1/8W
R226	ERD10TJ103	Carbon	10K ohms 1/8W
R227	ERD10TJ152	Carbon	1.5K ohms 1/8W
R301	ERD10TJ333	Carbon	33K ohms 1/8W
R302	ERD10TJ105	Carbon	1M ohms 1/8W
R303	ERD10TJ103	Carbon	10K ohms 1/8W
R304	ERD10TJ273	Carbon	27K ohms 1/8W
R305	ERD10TJ391	Carbon	390 ohms 1/8W
R306	o EROS2CKF5602	Metal	56K ohms 1/8W
R307	EROS2CKF2403	Metal	240K ohms 1/8W
R308	ERD10TJ822	Carbon	8.2K ohms 1/8W
R309	ERD10TJ392	Carbon	3.9K ohms 1/8W
R310,311	ERD10TJ103	Carbon	10K ohms 1/8W
R312	ERD10TJ333	Carbon	33K ohms 1/8W
R313	ERD10TJ562	Carbon	5.6K ohms 1/8W
R314	ERD25FJ101	Carbon	100 ohms 1/4W
R315	ERD10TJ680	Carbon	68 ohms 1/8W
R316	ERD10TJ153	Carbon	15K ohms 1/8W
R317	ERD10TJ752	Carbon	7.5K ohms 1/8W
R318	ERD10TJ101	Carbon	100 ohms 1/8W
R319	ERD10TJ102	Carbon	1K ohms 1/8W
R320	ERD10TJ270	Carbon	27 ohms 1/8W
R323	ERD10TJ101	Carbon	100 ohms 1/8W
R324	ERD10TJ222	Carbon	2.2K ohms 1/8W
R325	ERD10TJ272	Carbon	2.7K ohms 1/8W
R326	ERD10TJ103	Carbon	10K ohms 1/8W
R327	ERD10TJ152	Carbon	1.5K ohms 1/8W
R401	ERD10TJ333	Carbon	33K ohms 1/8W
R402	ERD10TJ105	Carbon	1M ohms 1/8W
R403	ERD10TJ103	Carbon	10K ohms 1/8W
R404	ERD10TJ273	Carbon	27K ohms 1/8W
R405	ERD10TJ391	Carbon	390 ohms 1/8W
R406	o EROS2CKF5602	Metal	56K ohms 1/8W
R407	EROS2CKF2403	Metal	240K ohms 1/8W
R408	ERD10TJ822	Carbon	8.2K ohms 1/8W
R409	ERD10TJ392	Carbon	3.9K ohms 1/8W
R410,411	ERD10TJ103	Carbon	10K ohms 1/8W
R412	ERD10TJ333	Carbon	33K ohms 1/8W
R413	ERD10TJ562	Carbon	5.6K ohms 1/8W
R414	ERD25FJ101	Carbon	100 ohms 1/4W
R415	ERD10TJ680	Carbon	68 ohms 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R416	ERD10TJ153	Carbon	15K ohms 1/8W
R417	ERD10TJ752	Carbon	7.5K ohms 1/8W
R418	ERD10TJ101	Carbon	100 ohms 1/8W
R419	ERD10TJ102	Carbon	1K ohms 1/8W
R420	ERD10TJ270	Carbon	27 ohms 1/8W
R423	ERD10TJ101	Carbon	100 ohms 1/8W
R424	ERD10TJ222	Carbon	2.2K ohms 1/8W
R425	ERD10TJ272	Carbon	2.7K ohms 1/8W
R426	ERD10TJ103	Carbon	10K ohms 1/8W
R427	ERD10TJ152	Carbon	1.5K ohms 1/8W
R501	ERD25FJ221	Carbon	220 ohms 1/4W
R502	ERD10TJ222	Carbon	2.2K ohms 1/8W
R503	ERD10TJ472	Carbon	4.7K ohms 1/8W
R504	ERD10TJ122	Carbon	1.2K ohms 1/8W
R505	ERD10TJ273	Carbon	27K ohms 1/8W
R506,507	ERD10TJ272	Carbon	2.7K ohms 1/8W
R508	ERD10TJ681	Carbon	680 ohms 1/8W
R509	ERD10TJ221	Carbon	220 ohms 1/8W
R510	ERD10TJ222	Carbon	2.2K ohms 1/8W
R511	ERD10TJ272	Carbon	2.7K ohms 1/8W
R512	ERD10TJ682	Carbon	6.8K ohms 1/8W
R513	ERD10TJ152	Carbon	1.5K ohms 1/8W
R514	ERD10TJ221	Carbon	220 ohms 1/8W
R515	ERD10TJ562	Carbon	5.6K ohms 1/8W
R516	ERD10TJ222	Carbon	2.2K ohms 1/8W
R517	ERD10TJ911	Carbon	910 ohms 1/8W
R518	ERD25FJ100	Carbon	10 ohms 1/4W
R519	ERD25FJ121	Carbon	120 ohms 1/4W
R520	ERD10TJ680	Carbon	68 ohms 1/8W
R521	ERD10TJ222	Carbon	2.2K ohms 1/8W
R522	ERD10TJ270	Carbon	27 ohms 1/8W
VR101	YFH0521A100	Variable Resistor	100 ohms
C101	ECEA1VU471	Electrolytic	470 µF 35V
C102	ECQM1H103JZ	Plastic	0.01 µF 50V
C103	ECCF1H101JC	Ceramic	100 pF 50V
C104	ECEA1AU101	Electrolytic	100 µF 10V
C105	ECQP1H182GZ	Plastic	1800 pF 50V
C106	ECQM1H104JZ	Plastic	0.1 µF 50V
C107	ECSF1CE335E	Electrolytic	3.3 µF 16V
C108,109	ECCF1H101JC	Ceramic	100 pF 50V
C110	ECSF1EE156	Tantalum	15 µF 25V
C111	ECEA1ESS470	Electrolytic	47 µF 25V
C112	ECEA1AU101	Electrolytic	100 µF 10V
C113	ECQM1H104JZ	Plastic	0.1 µF 50V
C114	ECSF1CE685	Tantalum	6.8 µF 16V
C116	ECSF1EE156	Tantalum	15 µF 25V
C125	ECSF1VE475	Electrolytic	4.7 µF 35V
C201	ECEA1VU471	Electrolytic	470 µF 35V
C202	ECQM1H103JZ	Plastic	0.01 µF 50V
C203	ECCF1H101JC	Ceramic	100 pF 50V
C204	ECEA1AU101	Electrolytic	100 µF 10V
C205	ECQP1H182GZ	Plastic	1800 pF 50V
C206	ECQM1H104JZ	Plastic	0.1 µF 50V
C207	ECSF1CE335E	Tantalum	3.3 µF 16V
C208,209	ECCF1H101JC	Ceramic	100 pF 50V
C210	ECSF1EE156	Tantalum	15 µF 25V

SYM-BOL NO.	PART NO.	DESCRIPTION	
C211	ECEA1ESS470	Electrolytic	47 µF 25V
C212	ECEA1AU101	Electrolytic	100 µF 10V
C213	ECQM1H104JZ	Plastic	0.1 µF 50V
C214	ECSF1CE685	Tantalum	6.8 µF 16V
C225	ECSF1VE475	Tantalum	4.7 µF 35V
C301	ECEA1VU471	Electrolytic	470 µF 35V
C302	ECQM1H103JZ	Plastic	0.01 µF 50V
C303	ECCF1H101JC	Ceramic	100 µF 50V
C304	ECEA1AU101	Electrolytic	100 µF 10V
C305	ECQP1H182GZ	Plastic	1800 pF 50V
C306	ECQM1H104JZ	Plastic	0.1 µF 50V
C307	ECSF1CE335E	Tantalum	3.3 µF 16V
C308,309	ECCF1H101JC	Ceramic	100 pF 50V
C310	ECSF1EE156	Electrolytic	15 µF 25V
C311	ECEA1ESS470	Electrolytic	47 µF 25V
C312	ECEA1AU101	Electrolytic	100 µF 10V
C313	ECQM1H104JZ	Plastic	0.1 µF 50V
C314	ECSF1CE685	Tantalum	6.8 µF 16V
C316	ECSF1EE156	Tantalum	15 µF 25V
C325	ECSF1VE475	Tantalum	4.7 µF 35V
C401	ECEA1VU471	Electrolytic	470 µF 35V
C402	ECQM1H103JZ	Plastic	0.01 µF 50V
C403	ECCF1H101JC	Ceramic	100 µF 3V
C404	ECEA1AU101	Electrolytic	100 µF 10V
C405	ECQP1H182GZ	Plastic	1800 pF 50V
C406	ECQM1H104JZ	Plastic	0.1 µF 50V
C407	ECSF1CE335E	Electrolytic	3.3 µF 16V
C408,409	ECCF1H101JC	Ceramic	100 pF 50V
C410	ECSF1EE156	Tantalum	15 µF 25V
C411	ECEA1ESS470	Electrolytic	47 µF 25V
C412	ECEA1AU101	Electrolytic	100 µF 10V
C413	ECQM1H104JZ	Plastic	0.1 µF 50V
C414	ECSF1CE685	Electrolytic	6.8 µF 16V
C425	ECSF1VE475	Electrolytic	4.7 µF 35V
C501,502	ECEA1AU101	Electrolytic	100 µF 10V
C503	ECCR1H100DC5	Ceramic	10 pF
C504	ECEA1ESS470	Electrolytic	47 µF 25V
C505	ECEA0JU102	Electrolytic	1000 µF 6.3V
C506	ECEA1AU101	Electrolytic	100 µF 10V
C507,508	ECKF1H221KB	Ceramic	220 pF 50V
C509	ECCF1H560J	Ceramic	56 pF 50V
C511	ECSF1CE335	Electrolytic	3.3 µF 16V
L102,202	EL05SI8R2K	Coil	8.2 µH
L302	EL05SI8R2K	Coil	8.2 µH
L303	YFELE-H8R2KA	Coil	8.2 µH
L402,501	EL05SI8R2K	Coil	8.2 µH
CN1-JM	EMCS0450Z	4 pin Jack Male	
CN6-JM	EMCS0750Z	7 pin Jack Male	
CN7,8-JM	EMCS0550Z	5 pin Jack Male	
CN9-12-JM	EMCS0350Z	3 pin Jack Male	
CN17-JM	EMCS0250Z	2 pin Jack Male	

SYM-BOL NO.	PART NO.	DESCRIPTION	
ALARM BOARD			
PCB8	o YFVKZJ400J2A	Printed Circuit Board Assy	
IC1	o MN40175B	IC	
IC2	o HD14071BP	IC	
IC3	o HD14072BP	IC	
IC4	o HD14081BP	IC	
IC5,6	o MN4069UB	IC	
IC7	o HD14081BP	IC	
IC8	MN4011B	IC	
IC9	YWHD14013BP	IC	
IC10	MN4011B	IC	
IC11	YWHD14013BP	IC	
IC12,13	YWHD14538BP	IC	
Q1	2SD973A-RS	Transistor	
Q2-7	2SD636-Q	Transistor	
Q8	2SC2377CD	Transistor	
Q9	2SA1254-BC	Transistor	
Q10	2SC2377CD	Transistor	
Q11	2SB641-QR	Transistor	
Q12-15	2SC2377CD	Transistor	
D1-3	MA150	Diode	
D4-7	MA4039H	Diode	
D8	MA150	Diode	
R1,3	ERD10TJ562	Carbon	5.6K ohms 1/8W
R4	ERD10TJ105	Carbon	1M ohms 1/8W
R5,6	ERD10TJ104	Carbon	100K ohms 1/8W
R7,8	ERD10TJ334	Carbon	330K ohms 1/8W
R9	ERD10TJ104	Carbon	100K ohms 1/8W
R10	ERD10TJ183	Carbon	18K ohms 1/8W
R11-15	ERD10TJ562	Carbon	5.6K ohms 1/8W
R16-19	ERD10TJ563	Carbon	56K ohms 1/8W
R20	ERD10TJ562	Carbon	5.6K ohms 1/8W
R21	ERD10TJ103	Carbon	10K ohms 1/8W
R22	ERD10TJ333	Carbon	33K ohms 1/8W
R23	ERD10TJ562	Carbon	5.6K ohms 1/8W
R24	ERD10TJ103	Carbon	10K ohms 1/8W
R25	ERD10TJ472	Carbon	4.7K ohms 1/8W
R26	ERD10TJ562	Carbon	5.6K ohms 1/8W
R27	ERD10TJ333	Carbon	33K ohms 1/8W
R28	ERD10TJ333	Carbon	33K ohms 1/8W
R29,30	ERD10TJ333	Carbon	33K ohms 1/8W
R31	ERD10TJ562	Carbon	5.6K ohms 1/8W
R32,33	ERD10TJ563	Carbon	56K ohms 1/8W
R34	ERD10TJ562	Carbon	5.6K ohms 1/8W
R35	ERD10TJ563	Carbon	56K ohms 1/8W
R36,37	ERD10TJ562	Carbon	5.6K ohms 1/8W
R38	ERD10TJ563	Carbon	56K ohms 1/8W
R39	ERD10TJ562	Carbon	5.6K ohms 1/8W
R40	ERD10TJ563	Carbon	56K ohms 1/8W
R41,42	ERD10TJ562	Carbon	5.6K ohms 1/8W
R43	ERD10TJ563	Carbon	56K ohms 1/8W
R44	ERD10TJ562	Carbon	5.6K ohms 1/8W
R45	ERD10TJ563	Carbon	56K ohms 1/8W
R46,47	ERD10TJ562	Carbon	5.6K ohms 1/8W
R48	ERD10TJ563	Carbon	56K ohms 1/8W
R49	ERD10TJ562	Carbon	5.6K ohms 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R50	ERD10TJ563	Carbon	56K ohms 1/8W
R51,52	ERD10TJ562	Carbon	5.6K ohms 1/8W
R53	ERD10TJ563	Carbon	56K ohms 1/8W
R54	ERD10TJ103	Carbon	10K ohms 1/8W
C1	ECEA1AM470T	Electrolytic	47 µF 10V
C2	ECQM1H224KZ	Plastic	0.22 µF 50V
C3	ECEA1HSS010	Electrolytic	1 µF 50V
C4	ECQM1H103JZ	Plastic	0.01 µF 50V
C5	ECEA1AM470T	Electrolytic	47 µF 10V
C6-9	ECQM1H103JZ	Plastic	0.01 µF 50V
C10	ECEA1AU330	Electrolytic	33 µF 10V
C11	ECEA1AU330E	Electrolytic	33 µF 10V
C12,13	ECEA1HN010S	Electrolytic	1 µF 50V
C14	ECEA1HSS010	Electrolytic	1 µF 50V
C15,16	ECQM1H103JZ	Plastic	0.01 µF 50V
C17	ECEA1CU100B	Electrolytic	10 µF 16V
C18	ECEA1HS010	Electrolytic	1 µF 50V
C19	ECEA1EN4R7S	Electrolytic	4.7 µF 25V
C20	ECQM1H103JZ	Plastic	0.01 µF 50V
C21	ECEA1CU100B	Electrolytic	10 µF 16V
C22	ECEA1HS010	Electrolytic	1 µF 50V
C23	ECEA1EN4R7S	Electrolytic	4.7 µF 25V
C24	ECQM1H103JZ	Plastic	0.01 µF 50V
C25	ECEA1CU100B	Electrolytic	10 µF 16V
C26	ECEA1HS010	Electrolytic	1 µF 50V
C27	ECEA1EN4R7S	Electrolytic	4.7 µF 25V
C28	ECQM1H103JZ	Plastic	0.01 µF 50V
C29	ECEA1CU100B	Electrolytic	10 µF 16V
C30	ECEA1HS010	Electrolytic	1 µF 50V
C31	ECEA1EN4R7S	Electrolytic	4.7 µF 25V
C32	ECQM1H103JZ	Plastic	0.01 µF 50V
C33-39	ECQM1H104JZ	Plastic	0.1 µF 50V
C40	ECEA1AU101	Electrolytic	100 µF 10V
CN1-JM	EMCS0450ZL	4 pin Jack Male	
CN3-JM	EMCS1350Z	13 pin Jack Male	
CN4-JM	EMCS0950Z	9 pin Jack Male	
CN5-JM	EMCS0850Z	8 pin Jack Male	

CAMERA POWER BOARD

PCB9	o YFVKZJ400J3A	Printed Circuit Board Assy
IC101,201	o YFBX7187-Z	IC
IC301,401	o YFBX7187-Z	IC
IC501	o AN78L09	IC
Q101	YW2SD843-0Y	Transistor
Q102	2SB642-QRS	Transistor
Q103	2SD636-Q	Transistor
Q104	2SA748-QR	Transistor
Q105,106	2SD636-Q	Transistor
Q201	YW2SD843-0Y	Transistor
Q202	2SB642-QRS	Transistor
Q203	2SD636-Q	Transistor
Q204	2SA748-QR	Transistor
Q205,206	2SD636-Q	Transistor

SYM-BOL NO.	PART NO.	DESCRIPTION	
Q301	YW2SD843-0Y	Transistor	
Q302	2SB642-QRS	Transistor	
Q303	2SD636-Q	Transistor	
Q304	2SA748-QR	Transistor	
Q305,306	2SD636-Q	Transistor	
Q401	YW2SD843-0Y	Transistor	
Q402	2SB642-QRS	Transistor	
Q403	2SD636-Q	Transistor	
Q404	2SA748-QR	Transistor	
Q405,406	2SD636-Q	Transistor	
D101,102	EM01Z	Diode	
D103,104	EM01Z	Diode	
D105	o 1SR124100A	Diode	
D106	MA165	Diode	
D107	YFHZ6LC2	Diode	
D108	o MA4270-HTA	Diode	
D201,202	EM01Z	Diode	
D203,204	EM01Z	Diode	
D205	o 1SR124100A	Diode	
D206	MA165	Diode	
D207	YFHZ6LC2	Diode	
D208	o MA4270-HTA	Diode	
D301,302	EM01Z	Diode	
D303,304	EM01Z	Diode	
D305	o 1SR124100A	Diode	
D306	MA165	Diode	
D307	YFHZ6LC2	Diode	
D308	o MA4270-HTA	Diode	
D401,402	EM01Z	Diode	
D403,404	EM01Z	Diode	
D405	o 1SR124100A	Diode	
D406	MA165	Diode	
D407	YFHZ6LC2	Diode	
D408	o MA4270-HTA	Diode	
R101	ERD25FJ103	Carbon	10K ohms 1/4W
R102	ERD10TJ681	Carbon	680 ohms 1/8W
R103	ERD10TJ392	Carbon	3.9K ohms 1/8W
R104	ERD10TJ150	Carbon	15 ohms 1/8W
R105	ERD10TJ562	Carbon	5.6K ohms 1/8W
R106	ER0S2TKF5102	Metal	51K ohms 1/8W
R107	ER0S2CKF1502	Metal	15K ohms 1/8W
R108	ERX2SJ4R7P	Metal	4.7 ohms 2W
R109	ERD25FJ562	Carbon	5.6K ohms 1/4W
R110	ERD25FJ101	Carbon	100 ohms 1/4W
R111	ERD25FJ332	Carbon	3.3K ohms 1/4W
R112	ERD10TJ101	Carbon	100 ohms 1/8W
R113	ERD10TJ513	Carbon	51K ohms 1/8W
R114	ERD10TJ332	Carbon	3.3K ohms 1/8W
R115	ERD10TJ123	Carbon	12K ohms 1/8W
R116	ERD10TJ562	Carbon	5.6K ohms 1/8W
R117	ER0S2CKF1802	Metal	18K ohms 1/8W
R201	ERD25FJ103	Carbon	10K ohms 1/4W
R202	ERD10TJ681	Carbon	680 ohms 1/8W
R203	ERD10TJ392	Carbon	3.9K ohms 1/8W
R204	ERD10TJ150	Carbon	15 ohms 1/8W
R205	ERD10TJ562	Carbon	5.6K ohms 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R206	ER0S2TKF5102	Metal	51K ohms 1/8W
R207	ER0S2CKF1502	Metal	15K ohms 1/8W
R208	ERX2SJ4R7P	Metal	4.7 ohms 2W
R209	ERD25FJ562	Carbon	5.6K ohms 1/4W
R210	ERD25FJ101	Carbon	100 ohms 1/4W
R211	ERD25FJ332	Carbon	3.3K ohms 1/4W
R212	ERD10TJ101	Carbon	100 ohms 1/8W
R213	ERD10TJ513	Carbon	51K ohms 1/8W
R214	ERD10TJ332	Carbon	3.3K ohms 1/8W
R215	ERD10TJ123	Carbon	12K ohms 1/8W
R216	ERD10TJ562	Carbon	5.6K ohms 1/8W
R217	ER0S2CKF1802	Metal	18K ohms 1/8W
R301	ERD25FJ103	Carbon	10K ohms 1/4W
R302	ERD10TJ681	Carbon	680 ohms 1/8W
R303	ERD10TJ392	Carbon	3.9K ohms 1/8W
R304	ERD10TJ150	Carbon	15 ohms 1/8W
R305	ERD10TJ562	Carbon	5.6K ohms 1/8W
R306	ER0S2TKF5102	Metal	51K ohms 1/8W
R307	ER0S2CKF1502	Metal	15K ohms 1/8W
R308	ERX2SJ4R7P	Metal	4.7 ohms 2W
R309	ERD25FJ562	Carbon	5.6K ohms 1/4W
R310	ERD25FJ101	Carbon	100 ohms 1/4W
R311	ERD25FJ332	Carbon	3.3K ohms 1/4W
R312	ERD10TJ101	Carbon	100 ohms 1/8W
R313	ERD10TJ513	Carbon	51K ohms 1/8W
R314	ERD10TJ332	Carbon	3.3K ohms 1/8W
R315	ERD10TJ123	Carbon	12K ohms 1/8W
R316	ERD10TJ562	Carbon	5.6K ohms 1/8W
R317	ER0S2CKF1802	Metal	18K ohms 1/8W
R401	ERD25FJ103	Carbon	10K ohms 1/4W
R402	ERD10TJ681	Carbon	680 ohms 1/8W
R403	ERD10TJ392	Carbon	3.9K ohms 1/8W
R404	ERD10TJ150	Carbon	15 ohms 1/8W
R405	ERD10TJ562	Carbon	5.6K ohms 1/8W
R406	ER0S2TKF5102	Metal	51K ohms 1/8W
R407	ER0S2CKF1502	Metal	15K ohms 1/8W
R408	ERX2SJ4R7P	Metal	4.7 ohms 2W
R409	ERD25FJ562	Carbon	5.6K ohms 1/4W
R410	ERD25FJ101	Carbon	100 ohms 1/4W
R411	ERD25FJ332	Carbon	3.3K ohms 1/4W
R412	ERD10TJ101	Carbon	100 ohms 1/8W
R413	ERD10TJ513	Carbon	51K ohms 1/8W
R414	ERD10TJ332	Carbon	3.3K ohms 1/8W
R415	ERD10TJ123	Carbon	12K ohms 1/8W
R416	ERD10TJ562	Carbon	5.6K ohms 1/8W
R417	ER0S2CKF1802	Metal	18K ohms 1/8W
R501	ERD25FJ681	Carbon	680 ohms 1/4W
R502	ERD10TJ153	Carbon	15K ohms 1/8W
R503	ERD10TJ151	Carbon	150 ohms 1/8W
VR102,201	YFH0521A4R7K	Variable Resistor	4.7K ohms
VR301,401	YFH0521A4R7K	Variable Resistor	4.7K ohms
C101	o ECES1HU472H	Electrolytic	4700 µF 50V
C102	ECEA1HF221	Electrolytic	220 µF 50V
C103	ECEA1VU222	Electrolytic	2200 µF 35V
C104	ECQM1H103JZ	Plastic	0.01 µF 50V
C105	ECEA1VU470B	Electrolytic	47 µF 35V

SYM-BOL NO.	PART NO.	DESCRIPTION	
C106	ECEA1CU100B	Electrolytic	10 µF 16V
C107	ECEA0JU331	Electrolytic	330 µF 6.3V
C108	ECEA1HU100	Electrolytic	10 µF 50V
C109	ECEA1ESS470	Electrolytic	47 µF 25V
C110	ECEA1VU101B	Electrolytic	100 µF 35V
C111	ECEA1HN3R3B	Electrolytic	3.3 µF 50V
C201	o ECES1HU472H	Electrolytic	4700 µF 50V
C202	ECEA1HF221	Electrolytic	220 µF 50V
C203	ECEA1VU222	Electrolytic	2200 µF 35V
C204	ECQM1H103JZ	Plastic	0.01 µF 50V
C205	ECEA1VU470B	Electrolytic	47 µF 35V
C206	ECEA1CU100B	Electrolytic	10 µF 16V
C207	ECEA0JU331	Electrolytic	330 µF 6.3V
C208	ECEA1HU100	Electrolytic	10 µF 50V
C209	ECEA1ESS470	Electrolytic	47 µF 25V
C210	ECEA1VU101B	Electrolytic	100 µF 35V
C211	ECEA1HN3R3B	Electrolytic	3.3 µF 50V
C301	o ECES1HU472H	Electrolytic	4700 µF 50V
C302	ECEA1HF221	Electrolytic	220 µF 50V
C303	ECEA1VU222	Electrolytic	2200 µF 35V
C304	ECQM1H103JZ	Plastic	0.01 µF 50V
C305	ECEA1VU470B	Electrolytic	47 µF 35V
C306	ECEA1CU100B	Electrolytic	10 µF 16V
C307	ECEA0JU331	Electrolytic	330 µF 6.3V
C308	ECEA1HU100	Electrolytic	10 µF 50V
C309	ECEA1ESS470	Electrolytic	47 µF 25V
C310	ECEA1VU101B	Electrolytic	100 µF 35V
C311	ECEA1HN3R3B	Electrolytic	3.3 µF 50V
C401	o ECES1HU472H	Electrolytic	4700 µF 50V
C402	ECEA1HF221	Electrolytic	220 µF 50V
C403	ECEA1VU222	Electrolytic	2200 µF 35V
C404	ECQM1H103JZ	Plastic	0.01 µF 50V
C405	ECEA1VU470B	Electrolytic	47 µF 35V
C406	ECEA1CU100B	Electrolytic	10 µF 16V
C407	ECEA0JU331	Electrolytic	330 µF 6.3V
C408	ECEA1HU100	Electrolytic	10 µF 50V
C409	ECEA1ESS470	Electrolytic	47 µF 25V
C410	ECEA1VU101B	Electrolytic	100 µF 35V
C411	ECEA1HN3R3B	Electrolytic	3.3 µF 50V
C501	ECEA1HU100	Electrolytic	10 µF 50V
C502	ECEA1ESS470	Electrolytic	47 µF 25V
C503	ECEA1VU101B	Electrolytic	100 µF 35V
L101	YFSFC2MH	Coil	2 mH
L102	YFPZC3MH	Coil	3 mH
L201	YFSFC2MH	Coil	2 mH
L202	YFPZC3MH	Coil	3 mH
L301	YFSFC2MH	Coil	2 mH
L302	YFPZC3MH	Coil	3 mH
L401	YFSFC2MH	Coil	2 mH
L402	YFPZC3MH	Coil	3 mH
CN2-JM	EMCS0450Z	4 pin Jack Male	
CN13-16-JM	EMCS0250Z	2 pin Jack Male	
M36	YWV52-LM05	Shield Cover (x8)	
M37	YWV1600LB01	Insulator	
M38	oYFV7DA0037A3	Heat Sink (x4)	

SYNC BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION	
PCB10	o YFVKZJ400E4A	Printed Circuit Board Assy	
IC1	YWSC6433	IC	
IC2	YW-MC4044P	IC	
IC3	YW-MC4024P	IC	
IC4	MN4517B	IC	
IC5,6	HD14006BP	IC	
IC7	o MN4015B	IC	
IC8	HD14071BP	IC	
IC9	o MN4019B	IC	
IC10	o MN4040B	IC	
IC11	o MN4019B	IC	
IC12-14	HD14081BP	IC	
IC15	o MN4043B	IC	
IC16	MN4520B	IC	
IC17	MN4556B	IC	
IC18	HD14584BP	IC	
IC19	o MN4011B	IC	
IC20	HD14081BP	IC	
IC21	o MN4019B	IC	
IC22	YWHD14013BP	IC	
IC23,24	o MN4023B	IC	
IC25	HD14071BP	IC	
IC26-29	MN4528B	IC	
IC30	o MN4024B	IC	
IC31	o MN4028B	IC	
IC32	o MN4011B	IC	
IC33,34	HD14081BP	IC	
IC35,36	o MN4069UB	IC	
IC37	HD14584BP	IC	
IC38	YFM50143001P	IC	
IC40	o MN4011B	IC	
IC41	MN74HC393	IC	
IC42	HD14049BCP	IC	
IC43	YWNJM78L05A	IC	
Q1-6	2SC2295-BC	Transistor	
D1-10	MA151K	Diode	
D11	1SV53B	Diode	
R1	ERJ8GCSJ562	Carbon	5.6K ohms 1/8W
R2	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R3	ERJ8GCSG333	Carbon	33K ohms 1/8W
R4	ERJ8GCSJ106	Carbon	10M ohms 1/8W
R5	ERJ8GCSJ224	Carbon	220K ohms 1/8W
R6-8	ERJ8GCSG183	Carbon	18K ohms 1/8W
R9-11	ERJ8GCSG332	Carbon	3.3K ohms 1/8W
R12	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R13,14	ERJ8GCSJ331	Carbon	330 ohms 1/8W
R15,16	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R17	ERJ8GCSG183	Carbon	18K ohms 1/8W
R18-25	ERJ8GCSG273	Carbon	27K ohms 1/8W
R26	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R27	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R29-31	ERJ8GCSG333	Carbon	33K ohms 1/8W
R32	ERJ8GCSJ222	Carbon	2.2K ohms 1/8W
R33	ERJ8GCSJ102	Carbon	1K ohms 1/8W
R34	ERJ8GCSJ150	Carbon	15 ohms 1/8W
VR1	YFH0521A6R8K	Variable Resistor	6.8K ohms
C1	ECEA1ESS470	Electrolytic	47 µF 25V
C2	ECEA0JU221E	Electrolytic	220 µF 6.3V
C3	YF426120CHKS	Ceramic	12 pF
C4	YF426682XKT	Ceramic	6800 pF 50V
C5	YF426120CHKS	Ceramic	12 pF
C6	YF426153XKT	Ceramic	0.015 µF 50V
C7	YF426102CHJS	Ceramic	1000 pF 50V
C8	ECQM1H683JZ	Plastic	0.068 µF 50V
C9	YF426330CHJS	Ceramic	33 pF 50V
C10	YF426470SLKS	Ceramic	47 pF 50V
C11-13	YF426101CHJS	Ceramic	100 pF 50V
C14	YF426111CHJS	Ceramic	110 pF 50V
C15	YF426101CHJS	Ceramic	100 pF 50V
C16	ECQM1H104JZ	Plastic	0.1 µF 50V
C17	ECSF1CE475	Tantalum	4.7 µF 16V
C18-25	YF426471SLFS	Ceramic	470 pF
C26	YF426222XKS	Ceramic	2200 pF 50V
C27	ECCF1H220JU	Ceramic	22 pF 50V
C101-103	ECQM1H104JZ	Plastic	0.1 µF 50V
C104,105	ECEA1AU101	Electrolytic	100 µF 10V
C106	ECQM1H104JZ	Plastic	0.1 µF 50V
C107, 108	ECEA1AU101	Electrolytic	100 µF 10V
C109,110	ECQM1H104JZ	Plastic	0.1 µF 50V
C111	ECEA1AU101	Electrolytic	100 µF 10V
C112	ECQM1H104JZ	Plastic	0.1 µF 50V
C113	ECEA1AU101	Electrolytic	100 µF 10V
C114,115	ECQM1H104JZ	Plastic	0.1 µF 50V
CT1	ECRHA030E11	Trimmer Capacitor	
L1	7P7553C	Coil	
L2	EL05SI8R2K	Coil	8.2 µH
X1	YWBWVHS3125K	Crystal Oscillator	31.25KHz
J1	ERJ8GCS0R00	Jumper Resistor	
CN1	EMCS0450Z	Connector	

ACCESSORY PARTS/PACKAGING PARTS

M51	oYFV8QA0970AN	Operating Instruction for WJ-400/BCG, WJ-400F
	oYFV8QA0971AN	Operating Instruction for WJ-400N/AC
M54	19998700331	Warranty Card for WJ-400B
M57	YWT20X35C03	Polyethylene Bag for Cable
M58	XZB26X40C05	Polyethylene Bag for Printed
M59	XZB45X63C05	Polyethylene Bag for Unit
M60	oYFV9CA0774AN	Packaging Assy
M61	YFV8FA0002A4	Packaging Label for WJ-400/BCG
M62	YNL1E	Packaging Label for WJ-400N/AC
	YFV8FA0016A4	Packaging Label for WJ-400F
	YFV8FA0070A4	Packaging Label for WJ-400/BCG, WJ-400N/AC
	YFV8FA0071A4	Packaging Label for WJ-400F

ORDER NO. VKD87031056T8

Technical Information

Model No. WJ-400

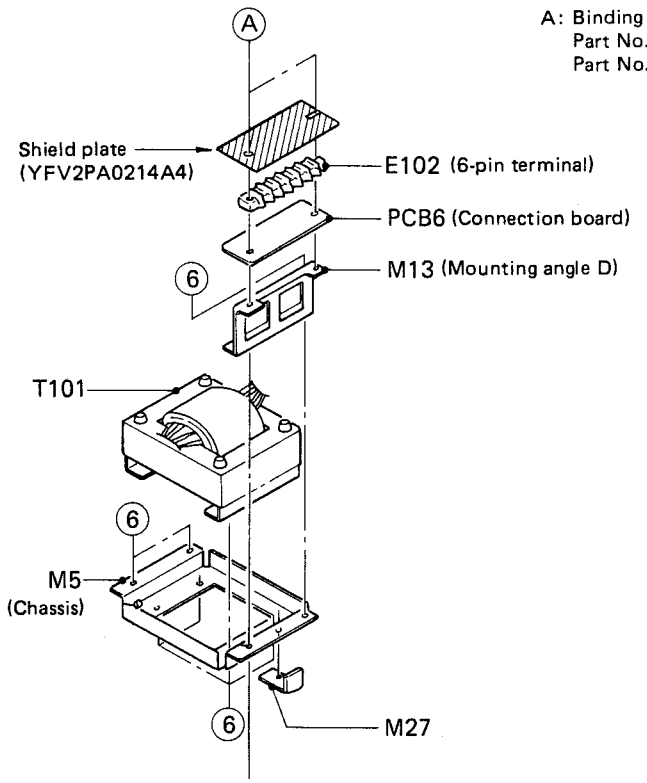
Subject : No Power

Symptom : Power source of WJ-400 Quad Unit may not be turned ON.
Applicable serial numbers are from the first production to a part of 71AXXXXX (January,'87 production).

Cause : The shrink tubes on the 6-pin terminal (E102) which protects the contact point might be torn, and the contact point touches to the upper cover (M2). The diodes D2, D4, D6 or D7 on the Power board is then broken.

Remedy :

1. Remove two screws holding 6-pin terminal (E102), Connection board and Mounting angle D (M13) from the chassis (M5).
2. Install the additional shield plate on the 6-pin terminal (E102) and fix the shield plate, 6-pin terminal, Connection board and Mounting angle D to the chassis using two long screws / Part No. XSB3 + 14FX or XSB3 + 16FX.



A: Binding Head Machine Screw
Part No. XSB3+14FX or
Part No. XSB3+16FX

National/Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Printed in Japan
B-438 Ⓟ 3